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Effect of Scientific Inquiry Learning Model Using Scientific Concepts Map and Attitudes to Skills Process Science Students

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Abstract
This research aims to; Analyze whether the students' science-process skills taught in scientific inquiry models use concept maps better than conventional learning. Analyze whether the science-process skills of students with above-average scientific attitudes are better than students who have below-average scientific attitudes And Analyze whether there is an interaction between scientific inquiry model using concept map with scientific attitude toward science process skill in student. This research is quasi experiment research with two group pretest-posttest design. The study population is all students of class VIII SMP Negeri 1 Batangtoru even semester of academic year 2016/2017. Sample in this research is taken by random class, that is as much as 2 class. Class VIII-1 as an experimental class is taught by scientific inquiry learning model using concept map, class VIII ¬ 2 as control class is taught by conventional learning. This research instrument uses essay test of science process skill and student's scientific attitude questionnaire declared valid. The resulting data were analyzed by two-lane anava. The results showed that: science process skills of students who are taught by the model of scientific inquiry using concept maps is better than conventional learning, students' science process skills of students who have a scientific attitude above average better than students who have a scientific attitude underweight And there is an interaction between scientific inquiry model using concept map with scientific attitude toward science process skill in students.
Keywords: scientific inquiry model, concept map, scientific attitude, science process skill

1. Introduction

Education is a major factor in the formation of the human person. In essence education is one of the activities includes activities to educate, teach and train. Completion of education should cover all aspects of learning in each field of study, one of the science subjects for junior high school.

The success of teaching science can not be separated from the quality of teachers as teachers of science, but the facts seen in the field on science learning, learning is still centered on the teacher, where students seem passive without involving students to learn to develop the skills of the science process. Science learning activities not only calculate or use the formula, but science learning will be more meaningful if the learning is done in accordance with the nature of science. Learning science is basically a product, a process and a scientific attitude. The nature of science as a product includes facts, concepts, principles, theories and laws. In terms of process, IPA determines the variables under study, by observing, questioning, hypothesizing, predicting, finding patterns and relationships, communicating, designing and creating, planning and conducting investigations and measuring and counting. These activities are part of the science process skills (Harlen & Elstgeest, 1994: 54-55).

Based on the results of interviews conducted on one science teacher in SMP Negeri 1 Batangtoru, said one of the causes of less interest in students in science lessons in junior high school is the lesson used by teachers. The learning model that teachers tend to use is conventional learning that is done by lecture and presentation methods. The knowledge of the physics concepts that the rest of the material acquires during the study is only theoretically, not practically yet. This means that theories and experiments have not been integrated. This is reinforced by the observation of students of class VIII SMP Negeri 1 Batangtoru that they rarely do practicum in learning. Students are always passive, just acting as listeners so that their scientific attitude also does not arise. Student activity is only seen in working on the matter of calculation only. This makes the students less motivated and less intensive learning of science. This is what brings the effects of the lack of science process skills students in science learning.

To solve the problems faced, there is a need for a way out in science lessons in junior high school in order to improve performance and give a positive impact. One of the Scientific Inquiry learning model is more suitable in use in science lesson of SMP. "The main purpose of scientific inquiry is to develop intellectual skills, critical thinking and scientifically capable problem solving". The phases in this model are (1) the students presented a field of research, (2) the students make the problem, (3) the students identify the problem in the study, (4) the students speculate to clarify the problem (Joyce et al, 2009: 194-195).

According to Joyce the learning model (2009: 190) is a pattern or plan that has been planned in such a way and used to compile the curriculum, organize the subject matter, and give instructions to the teachers in the class. The use of innovative learning models can make learning science more enjoyable and meaningful. One of the innovative learning models is the scientific inquiry teaching model. This learning model can be used to develop a scientific attitude and improve students' science process skills.

Scientific process skills are a skill that can be developed by using experiment. Aspects of science process skills include: (1) observing (observation), (2) asking questions, (3) formulating hypotheses, (4) predicting, (5) finding patterns and relationships of variables, (6) communicating effectively, (7)) Designing experiments, (8) conducting experiments, (9) manipulating effective materials and tools, (10) measuring and counting (Harlen and Elstgeest, 1994: 51-54). Inquiry Implementation helps students in learning concepts and provides opportunities for students to act like scientists to provide a more in-depth experience of science concepts.

Scientific attitude is one form of intelligence that is owned by every individual. Students' scientific attitudes in learning can affect student learning outcomes. Student's scientific attitude is basically no different from other skills (cognitive, social, process, and psychomotor). To bring up the scientific attitude of students also required a model of learning in accordance with the indicators held by the students' scientific attitude. According Bhaskara (2007: 123) categorize the scientific attitude into seven that is curiosity, thorough, honest, critical thinking, open, objective, responsibility.

The purpose of this research are: (1) To analyze science process skill in students taught by scientific inquiry model using concept map better than conventional learning. (2) What To analyze science process skills in students who have above average scientific attitudes is better than students who have below average attitudes. (3) To analyze the interaction between scientific inquiry model using concept map with scientific attitude toward science process skill in students.

2. Method

This research uses quasi experimental research with two group pretest-posttest design. Population in this study all students of class VIII SMP Negeri 1 Batangtoru even semester of the academic year 2016/2017. Sample in this research is taken by random class, that is as much as 2 class. Class VIII-1 as an experimental class is taught by scientific inquiry learning model using concept map, class VIII ¬ 2 as control class is taught by conventional learning. The research variables consist of independent variable and dependent variable and moderator variable. The independent variable is learning inquiry model of scientific inquiry. Dependent variable that is science process skill and moderator variable is student's scientific attitude. The treatment instrument in this research is RPP, Handout, student work sheet. The measurement instrument consists of a scientifically validated test of science process skills and a validated scientific attitude questionnaire. Data analysis used two way ANAVA test analysis.

3. Result and Discussion

The data were collected and analyzed in accordance with the research formulas and hypotheses presented below.

Is the science process skill of students taught by scientific inquiry model using concept maps better than conventional learning?

Table 1. Average Results of Process Skills Science class experiments and controls

Class	Pretes	Postes
controls	21,07	64,03
experiments	21,13	78,87

Based on table 1 it is seen that the average postes of the experimental class is better than the control class. The average value of each indicator for each experiment and control class can be seen in table 2.

Table 2. Average Score of Student's Answer Each Indicator of Process Scientific Skills Item Problem

No	Indicator Science Process Skills	Class	
		Controls	Experiments
1.	Observe	50,7%	67,7%
2.	asking question	69,7%	70,3%
3.	Formulate hypotheses	68%	73,3%
4.	Predict	55%	84%
5.	Find patterns and variable relationships	58%	81%
6.	Communicate effectively	73,3%	85%
7.	Designing an experiment	65,3%	87,3%
8.	Conducting an experiment	63,3%	85%
9.	Manipulate effective materials and tools	66,7%	83,3%
10.	Make a conclusion	70,3%	71,67%

From table 2, the difference of students' science process skill in each indicator is better in class of experiment than control class, and can be seen in Figure 1.

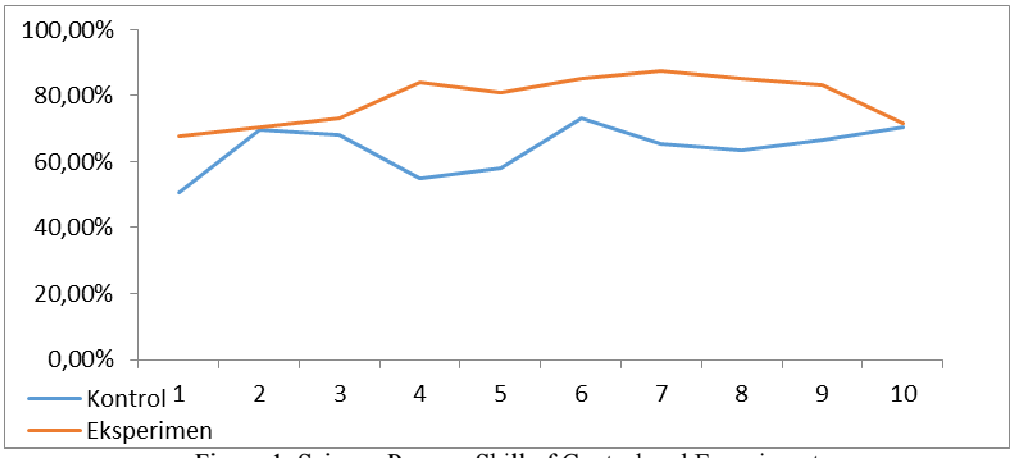

Figure 1. Science Process Skill of Control and Experiment

From Figure 1 above, we will see the skills of the science process in the control class and the experimental class. For the science process skill a maximum score of 10 each indicator. For the first indicator observation, it was obtained 50,7% experiment class and control class 50,7%, the second asked question was obtained equal to 68,3% experiment class and control class 69,7%, third is to formulate hypothesis obtained equal to 63,3% In the experimental class and control class 68%, the fourth predicted to be obtained by 47.7% experimental class and control class 55%, the fifth found the pattern and the variable relationship obtained by 64.3% in the experimental class and 58% control class, the six communicate effectively Obtained by 78% experimental class and control class 73,3%, seventh is designing experiments obtained by 70% in experiment class and control class 65,3%, eight experiments obtained by 66% in experiment class and control class 63,3% , Nine is manipulating materials and effective equipment obtained by 66% experiment class and control class 66.7% last make conclusion obtained by 66% experimental class and class Control 70.3%. The conclusion of the analysis is that experimental class science process skills are better than controls.

Ha1: Scientific process skills in students taught by scientific inquiry model using concept maps are better than conventional learning.

Are science process skills in students who have above average scientific attitudes better than students who have below average attitudes?

Table 3. Data of Student's Scientific Attitude

No	Scientific Attitude	Control	Experiment
1	Summary	2116	2405
2	Average	70,54	80,17

Based on table 3 above, it can be seen that the average scientific attitude in the experimental class is higher than the control class, then for the number of students who have the ability of above average scientific attitudes and below average can be seen in table 4 below.

Table 4. Number of students of scientific attitude above and below average

		Value Label	N
Learning model	1.00	Conventional	30
	2.00	Scientific Inquiry	30
Learning model	1.00	Scientific Attitude is below average	28
	2.00	Scientific Attitudes above average	32

Based on table 4. it is found that the overall students on the scientific attitude below the average of 28 students while on average as many as 32 students. The ANAVA statistics are shown in table 5.

Table 5. Two-way ANAVA test results

Scientific Attitude	Skills of the Science Process (B)		
	Conventional (A_1)	*Scientific Inquiry* (A_2)	
Above average (B1)	66,67	80,69	73,68
Below average (B2)	62,95	72,86	67,91
Average	64,81	76,78	

Ha2: Science process skills in students who have above average scientific attitudes are better than students who have below average attitudes.

Is there an interaction between scientific inquiry model using concept map with scientific attitude toward science process skill in students? who have below average attitudes?

Table 6. Output of ANAVA Two Line calculation

Source	Square Summary	Degree of Freedom	Degree of Average	F	Sig.
Corrected Model	3702.254[a]	3	1234.085	43.337	.000
Intercept	232379.876	1	232379.876	8160.434	.000
Learning Model	1660.045	1	1660.045	58.295	.000
Scientific Attitude	386.788	1	386.788	13.583	.001
Learning Model * Scientific Attitude	49.293	1	49.293	1.731	.004
Error	1594.679	56	28.476		
Total	311746.000	60			
Corrected Total	5296.933	59			

Based on Table 5, anava on the class of scientific attitude attribute significant value 0.004. Therefore, the significance value of 0.004 <0.05, it can be said that the test results reject Ho and or receive Ha in the alpha level of 0.05. It can be concluded that there is an interaction between scientific inquiry learning model using concept map and scientific attitude toward students' science process skill.

Based on the results of hypothesis testing above research can be described interaction between the learning model and the scientific attitude to the students' science process skills, as shown in Figure 2.

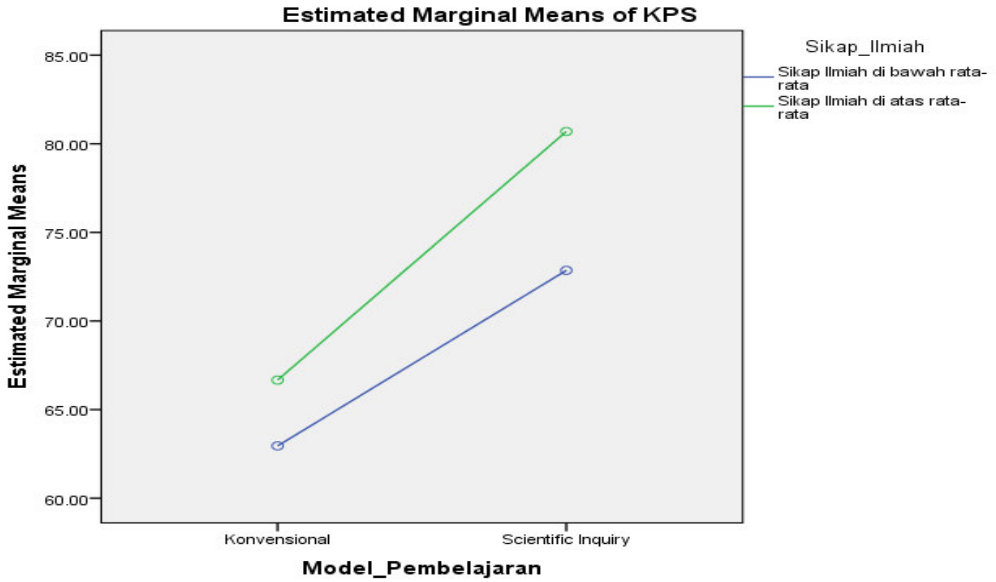

Figure 2. Interaction between scientific inquiry model using concept map, conventional with science process skill

4. Conclusion and Suggestion

4.1 Conclusion

Scientific process skills of students taught by scientific inquiry model using concept map better than conventional learning. Where the average value of scientific inquiry model using the concept map 78.87, which means better than the conventional class with an average value of 64.03.

Scientific process skills of students who have above average scientific attitudes are better than students who have below average scientific attitudes.

There is an interaction between scientific inquiry model using concept map with scientific attitude toward science process skill in students.

4.2 Suggestion

Educators should sort the learning materials in accordance with the scientific inquiry model using concept maps as well as attention to the completeness of learning resources in optimizing the implementation of learning.

Viewed from the character of the students, students who are unfamiliar with using scientific inquiry model using concept map, should be trained first to make simple problem solving reasoning when the learning is done so that students using this model the students have a fast response in doing the learning model.

Through the application of scientific inquiry model using concept map, should be taken into account with good division of the number of groups, not to too many students in one group, because it will result in students in groups not working effectively.

Another researcher who wishes to use scientific inquiry model using concept map is expected to use other moderator variable besides scientific attitude in research, because besides the learning model that can influence to the result of science process skill, but there are other factors that can be classified to influence student's knowledge.

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