LEARNING EFFECT BASED ON SOCIO-SCIENTIFIC ISSUE ON STUDENTS LEARNING OUTCOMES IN ENVIRONMENTAL POLLUTION MATERIALS IN SENIOR HIGH SCHOOL 1 OF MEUREUBO, WEST ACEH, INDONESIA

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ABSTRACT: *Biology is part of the natural sciences that discusses all aspects of life, both related to living things and the natural environment that supports the life of these living things. The biotic and abiotic components and their maintenance are important focus on biology learning. Students need a good understanding of their surroundings, maintaining, and controlling existing resources so they can take part as environmental preservation. Learning about the environment should have been designed and implemented with a learning model that is considered very appropriate to arouse interest as well as concern for students using learning models that synergize with efforts to preserve nature and the environment. Wrong on the environment is a learning model based on Socio-Scientific Issues. This study aims to determine the effect of Socio-Scientific Issues learning in environmental pollution learning in class X of SMAN 1 Meureubo West Aceh Regency. The approach used is a quantitative approach with the research design used is "Nonequivalent Control Group Design". The research data is in the form of student learning outcomes data on environmental pollution material on the application of Socio scientific-based learning issues on learning environmental pollution material. Learning outcomes data are analyzed using linear regression analysis followed by T test and F test. The results showed that there were significant differences in student learning outcomes and students response to the application of a socio scientific based learning model between before and after the application of the model. Through improved learning outcomes and students response to environmental pollution material, it is hoped that this can be a trigger for the movement to protect the environment from an early age.*

KEYWORDS: influence, Socio Scientific Issues, environmental pollution

INTRODUCTION

Education is a complex process that occurs in individuals. Learning activities mainly occur because of the continuous interaction between individuals and their environment (Ahmad, 2013). Biology Learning Material is a learning material that is very close to conceptual concepts and principles that are factual as Sugiharto (2013) argues that Biological material contains messages of facts, concepts and principles that tend to be based on the real conditions of individuals and their environment. Biology Education is a vehicle for students to learn about themselves and their surroundings. Besides that through biology learning students learn to recognize today's conditions as prospects for the next day. In BSNP (2008) states that Biology is the knowledge of the results of human activities obtained using steps scientific form of scientific method and obtained from the results of experiments or observations that are general in nature so that they will continue to be refined. The Biology learning process emphasizes providing direct experience through the use and development of

process skills and scientific attitudes to develop competencies in order to be able to explore and understand the surrounding environment (BSNP, 2008).

But in fact, the definition of the learning process so far is still dominated by the view that knowledge is a set of facts that must be memorized. On the other hand there are many facts that teachers master the subject matter well but cannot carry out learning activities properly. It happens because learning activities are not based on a particular learning model so student learning achievement becomes low. Biology is the study of living things, the environment, and interactions between them so that direct involvement between subjects and objects of science becomes very important (Amrullah, 2013). Biology education is closely related to everyday life. There are so many things in nature that can be controlled, maintained, and developed through a good understanding of biological sciences. Biology emphasizes giving experience directly, so students need to be helped to develop their understanding so that they are able to explore and understand the natural environment.

Learning about the environment should have been designed and implemented through a strategy that fits the needs of students in order to be able to deal with real problems in their environment to support increased learning outcomes and positive responses to environmental problems so as to develop their ability to make decisions and solve problems. Material of environmental pollution is one of the biological material that summarizes the state of the polluted environment, factors, prevention and prevention. Environmental pollution arises from human actions and can also be caused by natural disasters. (Imaningtyas, 2013). Environmental pollution material in schools usually discusses environmental damage from human activities. Environmental pollution is a phenomenon that cannot be eliminated, but can be limited through various efforts, especially increasing awareness of the importance of protecting the environment for the survival of humans and other living things in nature. Raising awareness of the importance of protecting the environment is certainly not an easy job. Early efforts are needed, especially education for young people related to environmental conservation so that the youth are able to understand well the ins and outs of environmental pollution, ranging from causes, conditions to polluted environments, prevention solutions and countermeasures.

Thus, it is very necessary for a special learning strategy related to environmental pollution so that this material can truly be understood so that a growing awareness of the nation's children to maintain and care for their environment for their survival in the future. The main thing that can be done is to increase student learning outcomes in environmental pollution material. Through good learning outcomes, it will synergize with a good awareness of the importance of protecting the environment. According to Abdurrahman (2015) Learning Outcomes are students' abilities through learning activities which consist of cognitive, affective, and psychomotor abilities. Learning outcomes are a reflection of the level of success of students in mastering the lesson after following the learning process and seen by the score of student learning outcomes after giving the test as a measure of learning outcomes. Darmadi (2014) explains that there are several factors that influence learning outcomes both internal and external. Internal factors concern students' interests and motivations and the physical condition of students in the learning process while external factors related to learning process supporting facilities include the use of strategies that are packaged in appropriate learning models to teach the material.

Socio Scientific Issues-based learning is a learning model in which study presentations are focused on issues or problems in everyday life that are conceptually closely related to

science. Environmental education is basically very appropriate to be implemented through Socio-Scientific Issues learning because the scope of environmental issues is closely related to daily life that does not only involve knowledge but also requires attitudes and skills to address and resolve existing environmental problems (Nuangchalerm, 2010). Based on the description of the problem arises the interest of researchers to find out more about the influence of the Socio Scientific Issues learning model on student learning outcomes in environmental pollution material.

The hypothesis raised in this study is, Ha: There is an increase in learning outcomes of class X students of Senior High School 1 of Meureubo with learning based on Socio-Scientific Issues on ecosystem material. Ho: There is no increase in learning outcomes of class X students of Senior High School 1 of Meureubo with learning based on Socio-Scientific Issues on ecosystem material. Environmental pollution material discusses the components of natural components and their supporters in life on earth. The focus of learning for environmental pollution is more focused on conditions of ecosystem damage caused by human activity and prevention and prevention. Socio-Scientific Issues based learning is a contextual aspect that is very much needed in environmental learning, considering that the scope of environmental issues is closely related to daily life that does not only involve knowledge, but also requires attitudes and skills to address and resolve existing environmental problems. Thus, environmental learning should be designed and implemented through strategies that can meet these contextual needs so that students can deal directly with real problems in their environment to support the formation of knowledge, values, attitudes, and skills in making problem-solving decisions (Subiantoro, 2013). According to Sadler (2004) Education based on Socio-Scientific Issues aims to stimulate and promote the development of individual intellectuals in morals and ethics and awareness of the interdependence between science and society. Socio-Scientific Issues learning strategies can be found in global contexts, such as the issue of genetic engineering (gene overlapping, cloning or stem cells) and environmental problems such as global warming and climate change.

Relevant research that has been conducted by other researchers with headlines relevant to this study, namely Research Widodo (2013) the application of Socio Scientific Issue-based models to develop character activities and improve concept understanding of class XI students showed an increase in students' understanding of concepts on business and energy. The results of the study were that there was an increase in student behavior thanks to the classical completeness in the experimental class, from 0% to 75%. While in the control class there was an increase in classical completeness from 0% to 53.57%. After testing and gain test for the pretest and posttest scores of students there is an increase in students' understanding of the concepts in terms of business and energy. Furthermore, the Subiantoro researcher (2013) influences the application of Socio Scientific Issue-based models on science learning outcomes of fourth grade students at SDN Sidokertosidoarjo. Based on observations and interviews, it is known that students prefer to actively participate in socio scientific issue learning compared to the usual learning models.

METHODOLOGY

This research was conducted in class X of Senior High School 1of Meureubo, West Aceh Regency, having its address at Gampoeng Peunaga Cut Ujong, Meureubo District, West

Aceh Regency. The approach used in this study was a quantitative approach. The research design used in this study was "Nonequivalent Control Group Design". In this design, the study used one experimental group with a control group with an pretest given to the two groups, then treated in the experimental class. The study ended with a final test (posttest) given to both groups namely the control and experimental groups.

The design of the research conducted can be described as follows;

Table 1. Research Design

Kel.	Pretest	Treatment	Posttest
Exspriment	O_1	X	O_2
Control	O_3	X	O_4

Note:

- O1 : Initial measurement of ability (*Pretest)* experimental group.
- O2 : Final ability measurement (*Posttest)* experimental group.
- X : Giving Treatment
- O3 : Initial measurement of ability (*Pretest)* control group.
- O4 : Final ability measurement (*Posttest)* control group.

The research stages are:

• Planning stage (Preliminary study and preparation of research tools)

• Implementation phase (Research activities and data collection)

• Final stage (data analyst activities and conclusion)

Data collection techniques are carried out through a test technique that serves to measure students' understanding of concepts. This test is done twice, namely before treatment which aims to determine the students' initial abilities and after treatment to determine the ability of students after treatment. The instrument used to measure understanding of concepts is a matter of the pretest and posttest. In this study the researchers used a test instrument in the form of multiple choice questions, which amounted to 20 questions.

Data analysis was carried out quantitatively by using linear regression analysis using the SPSS program and continued with the F test and t test. Linear regression is a statistical tool used to determine the effect of one or several variables on one variable. Variables that influence are often called independent variables, independent variables or explanatory variables and variables that are affected are often called dependent variables or dependent variables.

$$\hat{Y} = a + bX$$

Note:

$\hat{Y}$: Dependent variable (predicted value)

X : Independent variable

A : Constant (Y value 'if X = 0)

B : Regression coefficient (value of increase or decrease)

The test is carried out to test whether each of independent variable individually has a significant influence on the dependent variable. Ho = There is no significant influence between the Socio Scientific Issue model on student learning outcomes ($\rho1 = \rho2$). Ha = There is a significant influence between the Socio Scientific Issue model on student learning outcomes ($\rho1 \neq \rho2$). The F test is used to test the truth of the overall regression which is significant by comparing the calculated F greater than F table. In this case it needs to be done is the Significance and Regression Analysis test. Ho: Socio Scientific Issue Model by understanding concepts not linearly patterned (= 0), Ha: Problem Based Learning Model with an understanding of linear pattern concepts ($\neq$ 0).

RESULT

Results of the Control Class Pretest

Based on the results of the initial research it was known that the pretest results of students in the control class using conventional models in learning were known that the highest value of students was 65 and the lowest value of students was 40. The average score of students was 54 while the standard deviation reaches S = 6.805.

Experimental Class Pretest Results

The pretest results in the experimental class, namely with the highest score of the experimental class pretest was 65 and the lowest value was 50, and the average value of 59.25 the standard deviation of the experimental class pretest was S = 6.5444.

Control Class Posttest Results

After the learning process was carried out in the control class, the student learning outcomes were obtained with the highest score reaching 75 and the lowest value was 60 with an average value of 69 and standard deviation S = 4.757.

Post-Kels Experiment Results

In the experimental class, where treatment was given with the application of environmental pollution learning by applying the Socio scientific Issues based learning model obtained the highest score of students who experienced a very significant increase with the highest score of 95 and the lowest score of 70. The average student score reached 78 with a standard deviation of S = 8,013.

Prerequisite Test Results Hypothesis Test Analysis

Normality test

The normality test was carried out using the Liliefors test. Ho was accepted when the sample came from a population that was normally distributed, $L_0 > L_{table}$ at a significance level of 5%. The results of the normality test were set out in the following table 2.

Table 2 Normality Test Results of the Control Class

No	Clas	L_{hit}	$L_{(\alpha=0,05:n=20)}$	Conclusion
1	Pretes Con.	0.9301	0.0025	Normal
2	PostesCon..	0,7497	0.0025	Normal

From the table above it can be seen that in the pretest control class $L_0 = 0.9301$ and the posttest value obtained $L_0 = 0.7497$ where $L_{table} = 0.0025$, then $L_0 > L_{table}$ (0.9301 > 0.0025 and 0.7497 > 0, 0025). This figure shows that student learning outcomes in the control class come from populations that are normally distributed.

The same is true for the experimental class, population normality is also shown from the results of the normality test for the experimental class. The following are the results of the analysis carried out.

Table 3 Normality Test Results

No	Class	L_{hit}	$L_{(\alpha=0,05:n=20)}$	Conclusion
1	Pretes Eks.	0.9212	0.0025	Normal
2	Posttest Eks.	0,8409	0.0025	Normal

Based on the results of the normality test as set out in table 3 above it is known that $L_O > L_{table}$ (0.9212 > 0.0025, and 0.8409 > 0.0025) so that it can be concluded that the learning outcomes of students in the experimental class come from populations that are normally distributed. In addition to the normality of other prerequisite tests, a homogeneity test was also carried out. The homogeneity test results obtained that Fcount <Fable (0.4510 <0.5952, and 1.90567 <2.2566). This number shows that the sample comes from a population with homogeneous or equal variance

t Test Analysis Results

The t test was conducted to see the significance of the differences in the increase in understanding of concepts between the control and experimental classes. The hypotheses tested were: H0: $\mu A1 \leq \mu A2$ and Ha: $\mu A1 \geq \mu A2$. H0 is accepted if the price of r itung rtabel and Ha is rejected. Ha is accepted if the price is calculated $r_{hitung} \geq r_{tabel}$ and H_0 is rejected. The statistical test used is:

$$S^2 = \frac{(n1-1)S1^2 + ((n2-1)S2^2}{n1+n2-2}$$

then the combined variance of the two groups is:

$$S^2 = \frac{(n1-1)S1^2 + ((n2-1)S2^2}{n1+n2-2}$$

$$S^2 = \frac{(20-1)40,2046 + (20-1)47,9532}{20+20-2}$$

$$= \frac{763,8874 + 911,1108}{38}$$

$$= 44,0789$$

$$S = 6,6391$$

So:

$$t = \frac{x1-x2}{S\sqrt{\frac{1}{n1}+\frac{1}{n2}}}$$

$$= \frac{18,75-15,00}{6,6391\sqrt{\frac{1}{20}+\frac{1}{20}}}$$

$$= \frac{3,75}{(6,6391)(0,3162)}$$

$$= 1,786$$

Related to the price of t in the table with a significance level of $\alpha = 0.05$. t table = t $(1-1/2\alpha)$ (v1, v2): v1 = n2– 1 and n2 –1. t table = 0.4510 while t count = 1.786. Then it can be seen that the value of t count> t table or 1.786> 0.4510. With this value indicates that Ha is accepted and H0 is rejected. Then it can be concluded that the learning outcomes of students of environmental pollution material using the Socio Scientific Issues learning model differ significantly from student learning outcomes without using the learning model.

DISCUSSION

The results showed that there were significant differences between the control class namely the class without the application of socio scientific issue learning with the experimental class, namely the class with the application of socio scientific issues based learning models. Increasing student learning outcomes towards environmental pollution material after the application of the learning model is very significant.

The results of the study were obtained from a comparison of the increase in student learning outcomes for environmental pollution material obtained through pretest posttest in the control class and the experimental class. The pretest and posttest was done by giving the test questions in the form of questions about understanding concepts related to environmental pollution material with a number of 20 pieces consisting of questions about choice.

The questions given both to the control class and experiment are given the same questions with the same level of difficulty. Differences in treatment are given only to the learning

model used. In the learning control class carried out in accordance with the learning model that has been applied in learning in that class, namely the conventional model. While the experimental class was given a different treatment, namely the application of a Socio Scientific Issues-based learning model in learning environmental pollution material in the class. Through research and treatment provided, it was found that the average learning outcomes and increased understanding of concepts in the experimental class were higher than the control class.

The results of the study indicate that there was an effect of the application of a socio scientific issues learning model on student learning outcomes in environmental pollution material. Improved understanding of the concept can be seen from the results of the student's pretest and posttest. The average test results of the experimental class students increased from 59.25 to 78.00, while the results of student tests in the control class only increased from the results of the average score of 54.00 pretest increasing to 69.00. The results of the t test showed a significant difference between the increase in students' understanding of concepts in the control class and experiment. The results of the t_{hitung} test conducted after the prerequisite test of the homogeneity and normality test analysis were obtained, t_{hitung} was 1.786 and t table 0.4510. This value indicated that the result of $t_{hitung} > t_{tabel}$. Thus Ha was accepted and H_0 was rejected. This meant that there was a significant influence between the Socio Scientific Issue model on students' conceptual understanding ($\rho 1 \neq \rho 2$).

Socio Scientific Issues learning is a presentation of issues or problems in everyday life that are conceptually closely related to science. Environmental education is basically very appropriate to be implemented through Socio-Scientific Issues learning because the scope of environmental issues is closely related to daily life that does not only involve knowledge but also requires attitudes and skills to address and resolve existing environmental problems (Nuangchalerm, 2010). Through socio scientific Issues based learning on environmental pollution material students are encouraged to find out more about the material discussed because the learning model applied by pouring out real experiences and problems of the environment around attracts attention and interest in student learning. The attractiveness or attention of students to the material studied will increase students' understanding of the material. Because through good attention to matter, science that is essentially theoretical becomes more meaningful so that the memory of the concept of scientific concepts can be stored in the long-term memory of students. The existence of concept concepts in long-term memory is the interpretation of improving student learning outcomes.

Basically, a theory or concept of scientific concepts can be easily understood by every student with a different IQ scale. But what distinguishes learning outcomes between one student and another student is the ability of the student to understand the material or concept being taught. Understanding and understanding are two different conditions. To understand a person's theory does not require a long time, but a concept that is only understood will be very easy to forget so that the material or concept becomes meaningless and does not change anything for students who learn it. But the concept that is understood is material that is understood and then able to be remembered by students in the long term. Material that is understood will be able to be repeated and conveyed to other parties or practiced in their daily lives. The concept that has been understood by students is characterized by the ability of students to remember it at different times and the consistency of the typing for the concept remains the same in two different times.

Through learning Socio scientific issues students are not only encouraged to understand the learning concepts of environmental pollution material, but also provide good understanding to students about the nature of the material and its implementation in daily life. This condition certainly makes students attractive to study material which is then useful in their lives, causing student learning outcomes to the material to increase.

Based on the results of the study showed that learning using the Socio Scientific Issue-based model on environmental pollution material at Senior High School 1of Meureubo is significantly more effective in improving student learning outcomes compared to the use of conventional learning models.

CONCLUSION

Based on the results of the research and discussion, it can be concluded that the use of the Socio Scientific Issues based on learning model on environmental pollution material has an effect on student learning outcomes at Senior High School 1 of Meureubo, West Aceh Regency.

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