

The Influence of *Green Learning* Method of Scientific Process Skill in Biology Studies Faculty of Teacher Training and Education (*FKIP*) UISU Medan

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Abstract: This study aims to determine the effect of Green Learning method on the level of scientific skill process of Biology Students at *FKIP* UISU Medan. The research uses quasi experiment method with research population of all students of Biology Studies of *FKIP* UISU amounted to 103 students from Semester 2,4,6,8 which then used as samples as many as 21 students from semester 2 by way of purposive sampling. Instrument in this research is test of scientific skill process in the forms of pre test and post test, observation sheet, and also questionnaire. The result of scientific skill test before using Green Learning method is good enough at the level of mastery in accordance with the classification of the percentage index of the scientific skill process, that is 0 student (0%) and the mastery level for 21 students is (100%) with average score 23,19% and standard deviation 9,80, while scientific skill test by the method of Green Learning is good at mastery level according to classification of index of percentage of skill of scientific process, that is 2 students (9,5%) out of 16 students (76,1%) and less than 3 students (14,2%) with average score 27,50 and standard deviation 63,47.

1 INTRODUCTION

Learning requires innovations that are compatible with the progress of science and technology without neglecting the value of humanity and the nature of education (Ardi, 2017). Biology learning is learning that emphasizes the provision of experience directly.

Therefore, students need to be helped to develop a number of skill process so they can explore and understand the natural world (Sundari, 2012). Based on the results of observations made on biology students of *FKIP* UISU Medan, the real condition of biology learning in Biology Study Program *FKIP* UISU Medan has reflected a scientific learning as the essence of learning that not only prioritizing the product but also the process and scientific attitude, but in the learning process the source of learning from the environment or the natural environment has not been explored. The learning process of Biology course requires relevant sources / learning media. Nature as a place or home of living things will automatically become the object of study of Biology students. Learning in nature is a contextual learning to give a real picture of the object of study to be

studied. In addition, natural resources based on learning give a positive nuance to change the learning paradigm from textual to contextual. Learning is not only in the classroom by using print and electronic media, but also can be done by nature-based observational learning approach.

This approach encourages students to better interpret scientific methods and scientific attitudes (Ardi, 2017). Green learning is a method of learning development by teaching about the nature of the environment to the students. The concept of green learning is inspired by stagnation in developing a positive attitude towards the environment, lack of participation and role in environmental activities. Environment and ecology include the protection of the environment, love for environment, and the adverse effects of environmental degradation and global warming. Different environmental characteristics provide a different learning experience for students. Forests that are a source of real environmental learning provide an enchanting experience for students to learn and explore forests as a place to learn independently (Ardi, 2017). Learning by the method of Green Learning should

provide an opportunity for students to be actively involved in the learning process. This means that students must be directed to be able to interact with the learning environment. Students can feel the meaning of the lessons they have learned. In accordance with Jhonson's (Jhonson, 2002) in Gultom states that good learning is a learning that engages learners in learning activities and helps to associate academic lessons with the real-life context they face. Lessons will be easy to understand if they can feel the meaning of the subject matter. This learning process is expected to enable students to learn by means of Teacher Centered-learning as well as Student Centered-learning. The skill process approach is a learning approach that gives students the opportunity to participate in the process of discovery or the preparation of a concept as a scientific skill process. In relation to skill process in learning, teachers create varied forms of teaching activities, so that students are engaged in various experiences. Because of the advantages of the skill process students become creative, active, skilled in thinking and skilled in acquiring knowledge. The skills of the students can uplift his thinking patterns so as to improve the quality of learning (Rosiani, 2011). *Eden Garden 100* at Lumban Julu Toba samosir district, North Sumatra, is one of the forests that has good biodiversity.

Good biodiversity will support the biology learning process. Research on the Effect of Green Learning is a form of optimization of local potential based on natural resources functioning not only as a tourist object but also as a natural laboratory of learning development. As natural resources, students directly interact to observe and preserve so as to enhance scientific thinking using scientific method. This is called the science skill process. Based on the description of the problem then the researchers are interested in participating in Umbrella Research Team of PDUPT Research entitled "The Effect of Green Learning Method on the level of skill of Scientific Process of Biology Students of FKIP UISU".

2 RESEARCH METODOLOGY

This research is conducted at *Taman Eden 100* at Lumban Rang area, North Sionggang Village, Kec. Lumban Julu, Kab. Toba Samosir, applied at the Islamic University of North Sumatra on Jalan Sisingamangaraja, Teladan, Medan City, on students of 4th Semester T.A. 2017 / 2018. This type of research is a quasi-experimental research (Quasi

Eksperimen), a study intended to determine the existence or effect of a subject imposed on the students.

The procedures of this study include the following stages:

1. Stage of Preparation

Activities undertaken are:

 - a. Asking for permission to conduct research.
 - b. Conducting observation into the forest where the research is.
 - c. Searching for relevant literature / literature review.
 - d. Consulting a thesis supervisor.
 - e. Preparing research proposal and taking the seminar exam.
2. Implementation Phase

The implementation stages that have been designed are as follows:

 - a. Selecting the member of the sample class to be used.
 - b. Providing a pre-test before the students are taken to study directly to the field.
 - c. At the appointed time the students are taken to the forest of *Eden Garden 100* Lumban Julu.
 - d. Students are taught material sources from the forest.
 - e. Learning begins with students starting to observe the plants in the forest, then observing, identifying, interpreting, forecasting, asking questions, hypothesizing, planning experiments, using tools and materials, applying concepts, and communicating.
 - f. Teachers give instructions to students for things for students to do.
3. Settlement Phase

The activities undertaken at this stage include:

 - a. Performing data processing.
 - b. Performing process of data analysis.
 - c. Drawing a conclusion.
 - d. Preparing the Report by completing the attachments related to the research)

2.1 Research Instrument and Data Collection Techniques

Data in this research including quantitative are the levels of skill of scientific process on plant ecology material. The instruments used to collect data on students' scientific skill level are pre and post tests, observation sheets, and questionnaires.

1. Scientific Skill Test

The research instrument to test students' scientific skillprocess is to use essay problem based on scientific skillprocess indicator. The purpose of this test is to know the scientific skillprocess of learners in Biology learning. The materialsaretaken from the course subjects of Plant Ecology. The topic taken is Angiospermae Plant Vegetation. Preparation of the problem begins with a grid of questions and key answers of each item. The score of students scientific skillprocess is obtained from the scoring of the students' answers to each item.

2. Pre Test

The type of pre test is done at the beginning of the learning of the material taught before the learning process takes place that aims to determine the basic ability of students with the number of 10 valid items that are sourced from the test instrument in the form of a description (essay).

3. Post Test

Post Type tests area conducted at the end of learning about the materials that have been studied that aims to determine the level of skills of the cognitive domain of the scientific process. The test in this study is a non-objective description test with the total number of questions of 10 (items) similar with those of the pre test problems.

2.2 Data Analysis Technique

The data test results are collected after the completion of the test given to the students then scoring is done. The steps in data processing are:

1. Determining the average score of each group by using the following formula:

$$X = (\sum fixi) / (\sum fi) \quad (1)$$

Information:

X: Average

Xi: Total score

fi: Frequency

2. Calculating Standard Deviation,

$$S = \sqrt{(n\sum fi [xi]^2 - (\sum fi [xi])^2) / (n(n-1))} \quad (2)$$

Information:

S: Standard Deviation

n: Number of Respondents

xi: Class Signs

fi: The frequency corresponding to the Class xi mark

3. Using Gain Formula

$$Gain(g) = \frac{S_{post-Spretest}}{Smaks-Spre} \quad (3)$$

Information :

g = increase score

Spost = final test score

Spre = initial test score

Smaks = maximum score

Gain Score Criteria

No Score Gain Categories

1. $g < 0.3$ Low

2. $0.3 \leq g \leq 0.7$ Medium

3. $g > 0.7$ Height

4. Normality Test

This test aims to see normal distributed samples, using lilieforce test formula. The steps used for the test of normality are as follows:

- Observations X1, X2, Xn are made raw numbers Z1, Z2,Zn with the formula:

$$Z_i = (X_i - X) / n$$

- Calculating the odds of $F(Z_i) = P(Z \leq Z_i)$

- Calculating the proportions Z1, Z2, Zn the $\leq Z_i$, the proportion is expressed by S (Zi), then $S(Z_i) = \text{number of } S = (Z_1, Z_2, Z_3, \dots Z_n) / S$

- Calculatingthe difference $F(Z_i) - S(Z_i)$ then determining the absolute score.

- Taking the absolute scoreof the greatest of the difference is called Lo. Criteria testing normal distribution data if the score: Lo (count) <Lo (table) with a real level $X = 0.05$ then the normal distribution: Lo (count) > Lo (table) with the real level $X = 0.05$ then not normally distributed

5. Hypotesis Test

Testing the accepted or rejected research hypothesis is done by statistical testing with the formula :

$$t = Md / \sqrt{((\sum X^2 d) / (N(N-1)))}$$

With $Md = (\sum d) / N$ and $\sum X^2 d = \sum d^2 - ((\sum [d])^2) / N$

Information:

Md: Mean of pre test difference with post test

$\sum x^2 d$: Number of Deviation Squares

N: Subject of sample

3 RESULT AND DISCUSSION

3.1 Description of Research Data

Research data are obtained from the results of pre test and post test and observation sheet on plant ecology material. The data are calculated to determine the effect of Green Learning method on the students' scientific skillprocess level. The assessment of students essay test is declared to have succeeded if the level of mastery of scientific skillprocess equal or higher than 76 - 85% in accordance with scoring indicators. The student observation sheet is considered successful if the percentage of the average score is $80\% \leq NR < 90\%$.

Table 1: Test Point Scoring.

No	Test Point	fi	Xi	Xi ²	Fi.xi	Fi.xi ²
1	47-53	3	50	2500	150	7500
2	54-60	3	57	3249	171	9747
3	61-67	7	64	4096	448	28672
4	68-74	4	71	5041	284	20164
5	75-81	3	78	6084	234	18252
6	82-88	1	85	7225	85	7225
	Total		405	28195	1372	91560

The above table is to find the average value of post-test by dividing the total number of students with (fi.xi) 1372 with the frequency of the number of students (fi) as many as 21 so that the average score of pre-test (\bar{x}) 65,33 and standard deviation of 9.80.

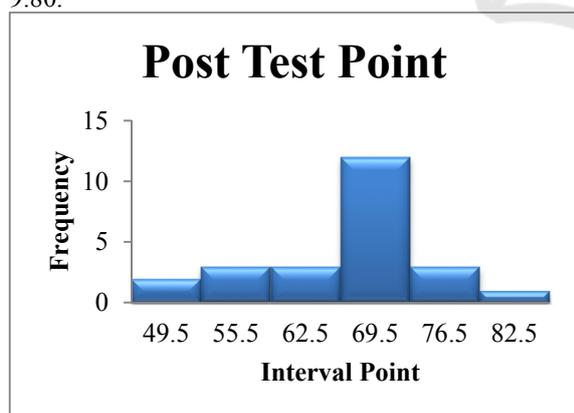


Figure 1: Graph Value Post test student FKIP Biology on Species Interaction materials.

Table 2: The Calculated Value of "Gain".

No	Question Indicator	Gain
1	Observing	0,40
2	Grouping/Classification	0,50
3	Interpreting/Interpretation	0,75
4	Forecast/Prediction	0,59
5	Asking Question	0,58
6	Hypotheses	0,40
7	Planning an Experiment	0,41
8	Using Tools/Materials	0,70
9	Implementing Concepts	0,29
10	Communicating	0,43

Learning model is needed by the lecturers and educators, because the success or failure of students in learning is dependent on precisely the model of learning used in accordance with the material learned so that the learning is designed to be more varied. So in this study the material species interaction method used is the method of Green Learning. The application of Green Learning method in this study aims to find out the data of scientific skillprocesslevel of students taught by using Green Learning method. The data obtained in this study are pre test, post test, gain score, average score of scientific skillprocessso that the influence of Green Learning method used could be seen. The use of this method of Green Learning demonstrates the improvement of scientific skillprocessin the cognitive domain of the test scores.

Data result of test score of students before using learning method of Green Learning by doing initial skill test is of average 23,18% and by seeing that result the average score of pre test still in level of mastery less matching with indicator score of scientific skillprocess. This bias is caused by the implementation of pre test as students are given the problem without previously done by the application of learning by using the method of Green. The result of the test of the students after the use of Green Learning method with the post test is 66.03%. From the average score, it can be seen that there is an increase of the student's test score because the method of Green Learning has advantages in the application of learning giving positive nuance, and more real learning by means of natural resource base.

This method can encourage students to explore directly the learning process and foster activity and scientific attitude. The result of Gain calculation obtained from the test is 0.4 and this is in average category and the acquisition of the observation sheet for the observed category (observation) is as much as 95% because at the time of observation there is a

guidance from a teacher. The result score of indicator of Grouping (Classification) is 0,50, which is in medium category, while the score obtained from observation sheet is 70%, the students show enough recognition on the plant based on the given characteristics. The result of score on interpreting indicator (Interpretation) is 0.75, in high category, meanwhile the score obtained from the observation sheet is 7.33%, and this shows that the students have the ability to conclude the activities that have been done then the students could organize, analyze, and select the findings and connect things that have been known and interpret them so that the score on the indicator interpretation is high.

The result of score on predicted indicator is 0,59, in medium category, meanwhile the score obtained from observation sheet is 92,5%; students are able to predict the condition from the observed object. The result of score on the indicator of Asking Question is 0.58, in satisfactory category, meanwhile the score from the observation sheet is 92,5%; the students are able to answer and give explanation when applied to a problem.

The results of the score on the hypothesized indicator is 0.40, in the medium category, while the score from the observation sheet is 65%; the students are less able to connect the hypothesis with the problem. The result of the scores on the indicator Plotting the experiment is 0.4, in the moderate category, while the acquisition score is 80% of the observation sheet; the students are able to plan the experiment and know step in doing observation and experiment. The result of gain scores from indicator Using Tools and materials is 0.70, medium category, while the score for observation sheet is 80%; students have succeeded and no longer have difficulty determining the tools and materials while doing the observation.

The result of the score of the indicators of Applying the Concept is 0.29, in low category, while the score from the observation sheet is 80%. Students are less able to accept the concept they learn concerning problems they are facing. The result of score from communicator indicator is 0.43, in medium category, while the score of observation sheet is 95%, Normality test results obtained by $L_0 < L_{table}$ is $0.17 < 0.190$ stating the data of normal distribution while the homogeneity test results obtained by $F_{hitung} < F_{table} = 1.83 < 2.12$ stating that the data has the same variance or homogeneous. Hypothesis test results using t test obtained is $t_{count} > t_{table}$ or $25.50 > 1.72$ with the level of trust 0.05 then H_a accepted and H_0 rejected. It can be concluded that there is a significant

influence of the use of Green Learning method to the level of scientific skill process of students of Biology at FKIP UISU MEDAN. The students are able to explain the observation result and describe the empirical data of the observation result.

3.2 Overall Calculated

Overall, the results show that the application of Green Learning method significantly influences students' skill in observing, classifying, interpreting, predicting, asking questions, hypothesizing, planning experiments, using tools and materials, as well as communicating learning outcomes, and has no significant effect on improving students' conceptualising skills. From the result of acquisition of percentage of score on observation sheet, in accordance with indicator of scientific skill process, it is found that for observer indicator obtained is 95%; this means that observation ability possessed by students is very good.

Interpreting indicator is equal to 73,3%; this means that the ability of students to interpret is sufficient. Indicators Group is 70%; this means that the ability of students in the grouping indicator is quite good. Indicator Forecast is 92.5%; this means the ability of students in the forecast is very good. Communicating Indicator is of 95% this means very good. The hypothetical indicator is 65%; this means that the ability of students in the hypothesis is less. Indicators planning the experiment is 80%; this means that the level of ability of students is quite good. Indicator Using tools and materials is 80%; this means the ability of students is good. Indicators applying the concept is 80%; this means student ability is quite good. The indicator asking questions is 81.6%; this means the ability of students in this case is quite good.

4 CONCLUSION

1. Based on the results of the analysis obtained from the pre and post tests, the students of biology study program of FKIP UISU have obtained the final improvement score, that is quite good, as well as associated with the calculation of observation sheets that have been assessed. Each indicator of the scientific skill process shows a good gain. The interpreting indicator (Interpretation), is 0.75, in high category, while the score obtained from the observation sheet is 7.33%.

2. Based on the results of data analysis obtained from the calculation of the observation sheet the percentage score of the final score is high enough that is equal to 95% on observing indicators (observation).
3. The results of the hypothesis test is $t_{count} > t_{table}$ or $25.50 > 1.72$ at the level of trust of 0.05 then there is a significant influence of the use of methods of Green Learning on the level of skills of scientific process of students of biology study program of FKIP UISU

4.1 Suggestion

Based on the above conclusions, the authors provide some suggestions:

1. For teachers and prospective teachers, especially those in the field of Biology study program, the method of Green Learning can be used as one of the learning models to improve the skills of the scientific process.
2. For other researchers who want to study the influence of learning method of Green Learning, this method should be used on materials with senses in the form of direct observation to the field or green nature-based learning in order to achieve better results and application of this Green Learning method.

REFERENCES

Ambarwati, Ayu. 2017. Influence of Learning Inquiry Lab Model to Scientific Process Skills and Scientific Attitudes of Students on Environmental Pollution Material Class X SMA YP UNILA BANDAR LAMPUNG.

Ardi, Muh Waskito. Dkk, 2017. Implementation of Green Learning Method (GeLem) in Development of Potential Local Potential-Based Teaching Materials at Wana Wisata Grape, Wungu District, Madiunmedia.number.com / media / publ.pdf

Arikunto, Suharsimi. 2006. Procedure Research A Practice Approach. Jakarta: PT Rineka Cipta.

Arikunto, Suharsimi. 2012. Basics of Educational Evaluation. Jakarta: Earth Literacy

Dimiyati and Mudjiono. 2015. Learning and Learning. Jakarta: PT. Rineka Cipta

Fatmawati, Baiq. 2010. Assessing Student Science Process Skills Through Direct Observation Learning Methods. Retrieved from <https://media.neliti.com/media/publications/171442-ID-value-the-process-science-process>

Guildford, J. 1956. Fundamental Statistic In Psychology And Education. New York: Mc. Graw Hill Book.Co.Inc

Gultom, Hotmian. 2017. Development of Skills Process Test Science and high-level learning results test krathwohl bloom on environmental change materials in the class x Sma negeri 9 medan t.p.2016 / 2017. UNIMED

Hadiani, La Rosdiani. 2011. The Influence of Approach of Science Process Skills to Student Biology Learning Outcomes .uinjkt.ac.id / pdf

Hariwijaya, M. 2007. Thesis Writing Technique and Thesis. Jakarta: Oryza
<https://intrystyn.wordpress.com/metode-belajar/>.
[http://www.google.com/search/your growth is accessed](http://www.google.com/search/your+growth+is+accessed) March 3, 2018
<http://www.tafsir.web.id/2013/04/tafsir-qaaf-ayat-1-15.html>

Jumarni, Nopri. 2013. The Influence of Implementation of Guided Inquiry Learning Model to Student's Student Process Skills. University of Lampung. Retrieved from <http://jurnal.fkip.unila.ac.id>

Malau, Esther Betaria. 2017. Student Process Skills on human respiratory system materials with guided inquiri method and demonstration methods in the class xi ipa sma negeri 1 sunggal t.p. 2016/2017. UNIMED

Mala, Nirta. 2017. The Influence of Guided Inquiry Learning Model on Improving Skills of Science Process and Scientific Attitudes of Class XI Student on Biology Subject at SMA YP UNILA BANDAR LAMPUNG. Retrieved from <http://jurnal.fkip.unila.ac.id>

Purwanto, Ngalm. 2002. Principles and Techniques of Teaching Evaluation. Bandung: Teens Rosdakarya

Savinem, A & Scoot, P.2002. The Force Concept: A Tool For Monitoring Student Learning. Physic Education

Sudjana. 2005. Statistical Method. Bandung: Tarsito

Sunarya, Yaya. 2013. Strategy Improving Test Description. Accessed from file.upi.edu

Lecturer Team UIU FKIP. 2018. Thesis Writing Guide. Medan: UISU Press.