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The Influence of The Green Learning Method (GeLem) on Students' Environmental Literacy related Biodiversity

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Abstract: This study aims to determine the effect of Green Learning Method (GeLem) learning on students' environmental literacy based on student learning outcomes on biodiversity material in class X Senior High School Prayatna Medan academic year 2021-2022. This research is quantitative and quasi-experimental in nature. In this study, the sampling technique was total sampling. The sample in this study consisted of students in class X IPA 2 as the experimental class and students in class X IPA 3 as the control class. The instrument used in the study was an essay test sheet to measure student learning outcomes on biodiversity material. In this study, it was found that there was an effect of the green learning method on students' environmental literacy based on student learning outcomes, obtaining an average score of 62.7 (pre-test) and 82.5 (post-test) with a percentage of 56.1%, which was categorized as effective enough. It can be concluded that there is an effect of the green learning method on students' environmental literacy based on student learning outcomes on biodiversity material.

Keywords: Green Learning Method, Learning Outcomes, Biodiversity

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INTRODUCTION

Environmental education is the process of recognizing values and concepts with the aim of building the knowledge, skills and attitudes needed to understand and appreciate the relationships between culture and the bio-physical environment. Environmental education also performs behavioral practices and makes decisions on issues related to environmental quality (Febriasari & Supriatna, 2017; Sabela et al., 2022; Sagala et al., 2019; Segera, 2015; Yusal et al., 2021). The purpose of this environmental education is for us to understand and take a stand about the problems that occur in the environment. The environment must be kept clean under any circumstances, because it can affect the living things around it (Siregar & Nasution, 2020). For example, for plants, if there is a lot of garbage or waste scattered on the ground, it can result in inhibition of its growth, because the nutrients found in plants come from the soil (Sabela et al., 2022) and making open channels in the form of ditches or what is commonly called a drainage system to overcome the discharge of water that comes out and pollutes the environment (Adnyano et al., 2022; Saputra et al., 2023).

Students' environmental literacy is still low due to several factors, namely the lack of interest of students to know and study environmental problems and a lack of caring attitude towards the environment (Afrianda et al., 2019; Meilinda et al., 2017; Nasution, 2016; Suryawati et al., 2020). Teachers as educators can be examples and provide stimuli that understanding the environment must be the basis of attitudes to be able to solve environmental problems for example do not litter, especially inorganic waste, because inorganic waste that is disposed of carelessly, especially on the ground, is difficult to decompose.

Humans are part of the environmental system that surrounds them. One of the advantages of humans is the mind given by Allah SWT. And it depends on humans to be good at using their minds and responding to the environment (Salim, 1989). Humans are given reason by Allah SWT to protect and preserve the environment not to damage it. Based on the explanation above, there is a letter related to the environment in the Koran, namely Q.S Al-Israa' verse 7 which reads:

إِنْ أَحْسَنتُمْ أَحْسَنتُمْ لِأَنفُسِكُمْ ۖ وَإِنْ أَسَأْتُمْ فَلَهَا ۚ فَإِذَا جَآءَ وَعْدُ ٱلْءَاخِرَةِ لِيَسُۥٓـُٔوا۟ وُجُوهَكُمْ وَلِيَدْخُلُوا۟ ٱلْمَسْجِدَ كَمَا دَخَلُوهُ أَوَّلَ مَرَّةٍ وَلِيُتَبِّرُوا۟ مَا عَلَوْا۟ تَتْبِيرًا

Meaning: "If you do good (meaning) you do good for yourself and if you do evil, then (crime) is for yourself, and when the moment of punishment for the second (crime) comes,

(we bring other people) to blacken your faces and they enter into the mosque, as your enemies entered it the first time and to destroy after - exhaust whatever they control ".

In the learning process there are many learning models used to improve student learning outcomes, even so the learning models have their own concepts in achieving their learning objectives . Based on the initial observations made in developing environmental literacy, students must know which learning model or learning method is appropriate. Of the existing methods, the one that is suitable for students in developing students' environmental literacy is the Green Learning Method (GeLem).

Green learning is a learning development method by teaching about the nature of the environment to students or students (Kuo & Madni, 2023). The concept of green learning is inspired by stagnation in developing positive attitudes towards the environment, lack of participation and role in environmental activities (Ardhi et al., 2014). Environment and ecology include how to protect this environment, what are the adverse effects due to environmental damage and global warming (Goldman et al., 2018). From learning the Green Learning Method (GeLem), one of the subjects that are suitable for this method is biodiversity (Rahayu et al., 2021). Biodiversity can be translated as all living things on earth, including plant, animal and other microbial species (Widjaja et al., 2014). All living things which are types of biodiversity are interconnected with each other, all have their respective roles in this life (Yuhanna et al., 2014). One of the benefits of studying biodiversity is that we know the kinds of flora and fauna that exist in this world.

This study aims to determine the effect of Green Learning Method (GeLem) learning on students' environmental literacy based on student learning outcomes on biodiversity material in class X Senior High School Prayatna Medan.

METHOD

The research approach used in this study is a quantitative research method approach with a quasi-experimental research type. This method is called the quantitative method because the research data is in the form of numbers and the analysis uses statistics (Sugiyono, 2015). This research was conducted at Prayatna Private High School Medan which is located at Jalan Letda Sujono No. 403, Medan Tembung District. The population in this study were all class X students of Prayatna Private High School Medan for the 2021/2022 Academic Year. The sample technique used in this sampling was total sampling. The sample in this study consisted of two classes, namely class X IPA 3 as the control class and X IPA 2 as the

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experimental class. In this study the data instruments used were observation (observers) and tests (pre-test and post-test).

The test used to determine the effect of the Green Learning Method (GeLem) on students' environmental literacy based on student learning outcomes is the Normalized Gain test (N-Gain) as in equation (1) (Hake, 1998).

$$N - gain = \frac{posttest\ score - pretest\ score}{maximum\ score - pretest\ score} \quad \text{.....(1)}$$

The categorization of the acquisition of the N-gain score is determined based on the N-gain value in the form of a percent (%). The distribution of N-gain acquisition categories in the form of percent (%) can refer to **Table 1**.

Table 1. Categories of interpretation of the effectiveness of N-gain

Percentage (%)	Interpretation
< 40	Tidak Efektif
40-55	Kurang Efektif
56-75	Cukup Efektif
>76	Efektiv

In addition, this study used the t-test with prerequisite tests, namely the homogeneity test and the normality test. Data analysis in this study uses calculations with Microsoft Excel.

FINDING AND DISCUSSION

To see the learning outcomes of researchers using the N-gain test in which the results of this test can be seen from all the pre-test and post-test values of the experimental class and the control class. The results of the data can be seen from **Table 2** which can be seen whether the learning outcomes by applying the Green Learning Method (GeLem) learning model to students' environmental literacy are effective or ineffective.

Table 2. Data on student learning outcomes in experimental and control classes

Class	Average		Percentage	Category
	Pre-test	Post-test		
Experiment	62.7	82.5	56.1%	Effective enough
Control	57.2	73.2	40.1%	Less effective

From **Table 2**, it is obtained that the learning outcomes of experimental class students on the pre-test value as a value to see students' initial abilities are known to be an average of 62.7 and the post-test score obtained after students are given material is known to have an average value of 82.5. By using the N-Gain test, the average pre-test and post-test scores were 56.1%, which means that the learning outcomes were categorized as quite effective. While the

learning outcomes of control class students on the pre-test value as a value to see students' initial abilities are known to be an average of 57.2 and the post-test score obtained after students are given material is known to have an average value of 73.2. By using the N-Gain test, it was found that the average pre-test and post-test scores were 40.1%, which learning outcomes were categorized as less effective.

In addition, this study used the t-test with prerequisite tests, namely the homogeneity test and the normality test. Data analysis in this study uses calculations with Microsoft Excel.

The normality test was carried out using the Lilliefors equation with the aim of knowing that the research data were normally distributed. If the data is normal then the data can be continued to the analysis stage. The results of the normality test for research data can be seen in **Table 3** and **Table 4**.

Table 3. Data from pre-test normality test results

Class	L_0	L_{table}	Information
Experiment	0,1569	0,161	Normal
Control	0,105892	0,161	Normal

If $L_0 < L_{table}$ then the data is normally distributed. In the results of the pre-test normality test for the experimental class, it was found that the L_0 value was 0.1569 while in the control class the L_0 value was 0.105892. The L_{table} of 30 respondents from each class is 0.161. So it can be concluded that the data from the pre-test results for the experimental class and the control class are normally distributed.

Table 4. Post-test normality test data

Class	L_0	L_{table}	Information
Experiment	0,117302	0,161	Normal
Control	0,096298	0,161	Normal

If $L_0 < L_{table}$ then the data is normally distributed. In the post-test normality test results for the experimental class, it was found that the L_0 value was 0.117302 while in the control class the L_0 value was 0.096298. The L_{table} of 30 respondents from each class is 0.161. So it can be concluded that the post-test data for the experimental class and the control class are normally distributed.

Homogeneity test was carried out to see the variance of the two samples used in the study, whether the variance was homogeneous or not. Homogeneity test using the F_{count} equation by comparing the largest variance with the smallest variance. The results of the homogeneity test are seen in **Table 5** and **Table 6**.

Table 5. Data from pre-test homogeneity test results

Class	Variance	F_{count}	F_{table}	Information
Experiment	106,4368	1,238233	1,860811	Homogeneous
Control	85,95862			

F_{count} <F_{table}, so the data is homogeneous, from **Table 5** it is known that the value of F_{count} is 1.238233. The number of samples from the data is 30, dk experimental class 30 – 1 = 29 and dk control class 30 - 1 = 29. F_{table} for dk control class and experimental class is 1.860811. From the table above it is known that F_{count} <F_{table}, so the results of the pre-test are homogeneous.

Table 6. Data from post-test homogeneity test results

Class	Variance	F_{count}	F_{table}	Information
Experiment	70,18966	1,374994	1,860811	Homogeneous
Control	96,51034			

F_{count} <F_{table}, so the data is homogeneous, from **Table 6** it is known that the value of F_{count} is 1.374994. The number of samples from the data is 30, dk experimental class 30 – 1 = 29 and dk control class 30 - 1 = 29. F_{table} for dk control class and experimental class is 1.860811. From the table above it is known that F_{count}< F_{table}, so the post-test results are homogeneous.

Hypothesis testing can be done after the distribution data is normal and homogeneous. The purpose of testing the hypothesis is to find out the hypothesis H_0 or H_a that will be accepted. **Table 7** shows the results of the learning outcomes hypothesis test.

Table 7. Data from learning outcomes hypothesis test results

Statistical Value	Experimental Class	Control Class
Average	-20,1	-17,0333
Standard Deviation	5,114887	5,209298
√n	5,477226	5,477226
Number of Samples	30	30
T. count	-21,5239	-17,9094
T. table	2,04523	2,04523
Information	Ho reject	Ho reject
	Ha accept	Ha accept

It is known from **Table 7** that the experimental class average is -20.1. The average control class is -17.0333. The experimental class standard deviation is 5.114887, the control class standard deviation is 5.209298. The sum of √n for each experimental class and control class is 5.477226. The number of each sample of the experimental class and control class is 30.

Reject H_0 if $t_{count} < t_{table}$. Accept H_0 if $t_{count} > t_{table}$. The t_{count} for the experimental class is -21.5239 while the Ttable for the experimental class is 2.04523, so it has been obtained -21.5239 <2.04523, then H_0 is rejected, H_a is accepted, which means that the average score before is not the same as the score after. Tcount for control class is -17.9094 while t_{table} for control class is 2.04523, so 17.9094 <2.04523 has been obtained, then H_0 is rejected H_a is accepted, which means that the average score before is not the same as the score after.

To see the effect of Green Learning Method (GeLem) learning on students' environmental literacy based on learning outcomes, questions that refer to indicators of environmental literacy are needed which consist of four indicators which can be seen from **Table 8**.

Table 8. Environmental Literacy Indicator Data

Environmental Literacy Indicator	Question
Environmental knowledge which includes environmental basics	1 and 7
Attitudes towards the environment which include views about the environment, sensitivity to environmental conditions, and feelings towards the environment.	2, 3, 6 and 9
Cognitive skills which include identification of environmental problems, environmental analysis, and planning implementation	4, 8, and 10
Behavior that includes concrete actions towards the environment.	5

From **Table 8**, it is obtained that indicators of environmental literacy ability consist of four aspects, namely: 1) Environmental knowledge which includes the basics of the environment, 2) Attitudes towards the environment which include views about the environment, sensitivity to environmental conditions, and feelings towards the environment, 3) Cognitive skills which include identification of environmental problems, environmental analysis, and planning implementation, and 4) Behavior which includes concrete actions towards the environment. Which, the first indicator covers questions numbers 1 and 7, the second indicator covers questions numbers 2, 3, 6, and 9, the third indicator covers questions numbers 4, 8, and 10, and the fourth indicator covers question number 5.

Based on the results of research on learning outcomes conducted in the experimental class using the Green Learning Method (GeLem) learning model conducted in class X IPA 2 with a total sample of 30 people, the average pre-test score was 62.7, of which 27 students scored means that it is below the KKM (77) and 3 students score above the KKM (77), this is because the students have not been given the material. Furthermore, the post-test score is

known to have an average value of 82.5, of which 23 students score means above the KKM (77) and 7 students score below the KKM (77). By using the N-Gain test, the average pre-test and post-test scores were 56.1%, which means that the learning outcomes were categorized as quite effective. The t_{count} for the experimental class is -21.5239 while the t_{table} for the experimental class is 2.04523, so it has been obtained -21.5239 <2.04523, then H_0 is rejected, H_a is accepted, which means that the average score before is not the same as the score after.

In the learning outcomes carried out in the control class using the lecture learning model conducted in class X IPA 1 with a total sample of 30 people, the average pre-test score was 57.2, where all students scored below the KKM (77). Because students have not been given the material. Furthermore, the post-test score is known to have an average value of 73.2, of which 11 students score above the KKM (77) and 19 students score below the KKM (77). By using the N-Gain test, it was found that the average pre-test and post-test scores were 40.1%, which learning outcomes were categorized as less effective. t_{cout} for control class is -17.9094 while t_{table} for control class is 2.04523, so 17.9094 <2.04523 has been obtained, then H_0 is rejected H_a is accepted, which means that the average score before is not the same as the score after.

Based on the results of this study, it is known that the highest learning outcomes are in the experimental class by applying the Green Learning Method (GeLem) learning model to students' environmental literacy which influences learning outcomes. This is in accordance with previous research by Savitri et al. (2017) that the green learning method affects communication skills and student learning outcomes. In addition, based on the results of previous research by Widiyanti (2019) entitled The Effect of the Green Learning Method with Photovoice on Ecosystem Material on Communication Ability and Learning Outcomes of Middle School Students, it is stated that the green learning method with photovoice has a strong and positive effect on communication skills and learning outcomes for junior high school students. Putra et al. (2021)said that good environmental literacy will also have a good influence on students' environmental literacy and knowledge.

Indicators or one's environmental literacy skills can be measured through four components, namely: Environmental knowledge which includes the basics of the environment, Attitude towards the environment which includes views about the environment, sensitivity to environmental conditions, and feelings towards the environment. Cognitive skills which include identification of environmental problems, environmental analysis, and planning implementation. And behavior that includes concrete actions towards the environment. Which are 10 questions made based on the four components of the indicator.

Questions 1 and 7 are aspects of environmental knowledge which cover the basics of the environment. Questions 2, 3, 6 and 9 are aspects of attitudes towards the environment which include views about the environment, sensitivity to environmental conditions, and feelings towards the environment. Questions 4, 8, and 10 are aspects of cognitive skills which include identifying environmental problems, environmental analysis, and planning implementation. And question number 5 is a behavioral aspect which includes concrete actions towards the environment.

CONCLUSION

There is an effect of the green learning method on students' environmental literacy on student learning outcomes. This is because, based on the research results, it is known that the highest learning outcomes are in the experimental class by applying the Green Learning Method (GeLem) learning model to students' environmental literacy which influences learning outcomes.

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