The Effect of Field Trip on Biodiversity Knowledge and Environmental Sustainability Attitude of Class X Students of SMA Unggulan Haf-Sa Zainul Hasan BPPT-Genggong

Yenny Rahma[1], Hadi Suwono[2,] Sulisetijono[3]
[1] Master of Biology Education, State University of Malang, Indonesia
[2,3] Department of Biology, State University of Malang, Indonesia

ABSTRACT

The issue of biodiversity is a concern for the whole world today. Education is key in developing knowledge and issues that affect biodiversity in the world. Biodiversity awareness programs are a national responsibility. To achieve this, it is necessary to have knowledge of biodiversity for the community. Inadequate knowledge can affect a person's attitude to the environment. This study aims to determine the influence of field trips on biodiversity knowledge and environmental sustainability attitudes of grade X students of SMA Unggulan Haf-Sa Zainul Hasan BPPT-Genggong. This study was quasi-experimental with a nonrandomized control-group pretest-posttest design. There were 36 students as the experimental group and 36 students as the control group. The results showed that the pretest and posttest data both biodiversity knowledge and environmental sustainability attitudes had normal and homogeneous data, namely with sig. above 0.05. Data analysis with biodiversity knowledge ancova has an F count of 25,674, sig. 0.00 and environmental sustainability attitude has F count 8.757, sig. 0.004. So it can be concluded that learning material on the diversity of living things with the field trip method affects biodiversity knowledge and environmental sustainability attitudes of grade X students of SMA Unggulan Haf-Sa Zainul Hasan BPPT-Genggong.

Corresponding Author:
Hadi Suwono,
Department of Biology, State University of Malang
Jl. Semarang, No. 5, Sumbersari, Kec. Lowokwaru, Kota Malang, Jawa Timur 65145
Email: hadi.suwono.fmipa@um.ac.id

1. INTRODUCTION

Indonesia is one of the megadiverse countries (Johnson et al., 2019; Sukardiyono & Rosana, 2019). Forests in Indonesia are the third largest forests in the world after Congo and Brazil (Turubanova et al., 2018). The level of biodiversity is very high, both ecosystem, species, and genetic diversity. However, such diversity is degraded continuously. This is due to the rapid development of forest area projects (Maskun et al., 2021), mining activities, and waste disposal into the environment without being treated first resulting in environmental damage and ecosystems being disrupted (Saraswati et al., 2019). The issue of biodiversity is of concern to the whole world today. Education is key in developing knowledge and issues affecting biodiversity in the world. Concerns about biodiversity loss motivated the United Nations to declare 2020 the Decade of Biological Diversity. The aim is to raise public awareness about priorities in maintaining biodiversity. The Convention on Biological Diversity says biodiversity awareness programs are a national responsibility (CBD & UNEP, 2019). To achieve this, it is necessary to have knowledge of biodiversity for the community.

The curriculum in Indonesia has included biodiversity knowledge called Diversity of Living Things. The subject of Diversity of Living Things is included in class X Phase A biology learning. However, overall the knowledge of biodiversity possessed by the younger generation (Levé et al., 2019) and ordinary people in general is still very little (Schneiderhan-Opel &; Bogner, 2020). The results of the needs analysis showed that only 20% of students could explain one of the indicators of biodiversity knowledge about the benefits of ecosystems in human life, such as shelter, food, medicine, and nutrient recycling. Knowledge of biodiversity is very important because what humans do today affects biodiversity in the world. In accordance with the statement of Aripin et al. (2021) that learning about the environment and biodiversity has an important position in developing sustainability attitudes, awareness, and behaviors. Inadequate knowledge can affect a person's attitude to the environment.

The world of education plays an important role in preparing future generations who have attitudes and concerns for biodiversity and have the ability in the field of systematics to protect biodiversity from extinction. The results of the analysis of environmental sustainability attitudes conducted in high school amounted to 50% of students showing environmental sustainability attitudes. The results of the analysis showed that students did not like nature exploration activities and were less sure that human intelligence, especially science and technology, could be used to solve environmental problems. These two things must be owned by students, because they are indicators of environmental sustainability attitudes put forward by Milfont and Duckitt in 2010. This indicator is widely used by previous researchers, such as research on the feasibility of environmental pollution modules based on environmental worldview and environmental attitudes (Syamsussabri et al., 2019). The lack of knowledge of biodiversity and environmental sustainability attitudes occurs because students only learn in classrooms and school scopes, so they do not enjoy nature outside of school. To increase love for nature, effective and dynamic learning is needed, such as learning by doing field trip activities.

Learning methods outside of school or can be called field trips such as learning in nature reserves are often designed to improve human relationships with nature, encouraging understanding of the concept of biodiversity and pro-conservation behavior (Kamudu et al., 2022). This method teaches authentic biodiversity learning and provides infomal learning opportunities for students by focusing on instilling a sense of fun, interest, and curiosity, so this method is expected to increase biodiversity knowledge and environmental sustainability attitudes among students.

2. RESEARCH METHOD

This study aims to determine the influence of field trips on students' biodiversity knowledge and environmental sustainability attitudes. This study used quasi-experimental with nonrandomized control-group pretest-posttest design (Leedy & Ormrod, 2019: 233). The research design can be seen in table 1.

Table 1. *Research Nonrandomized Control-Group Pretest-Posttest Design*

Group	Pretest	Treatment	Posttest
Control	O_1	X_1	O_2
Experiment	O_3	X_2	O_4

Pretest of biodiversity knowledge and ecological literacy is characterized by O1 and O3. Posttest of biodiversity knowledge and ecological literacy is characterized by O2 and O4. Learning with the field trip method is marked with X2, while learning without field trip is marked with X1. The study will be conducted in July-August 2023. The sample of this study was 72 students of grade x semester 1 of the 2023/2024 academic year on SMA Unggulan Haf-Sa Zainul Hasan BPPT-Genggong, 36 students as the control class and 36 students as the experimental class. Free variables in the form of learning methods with field trips and dependent variables in the form of biodiversity knowledge and environmental sustainability attitudes. Data collection techniques using instruments on the description of biodiversity knowledge based on Aripin et al. (2021) in table 2 and an inventory of environmental sustainability attitudes based on Milfont &; Duckitt (2010) in table 3. Data analysis to determine the effect of field trips on biodiversity knowledge and environmental sustainability attitudes using covariance analysis (ancova) starting with normality tests using shapiro-wilk tests and homogeneity tests using levene tests of equality of error variance.

Table 2. Biodiversity Knowledge Indicators and Rubrics

No.	Indicators	Rubrics	Score
1	Understand the concept of biodiversity, megabiodiversity countries, and biodiversity hotspots	Can explain biodiversity at the level of genes, types, and ecosystems, and mention examples of each completely. Can explain what is meant by megadiversity countries and mention countries that are included in the 17 megadiversity countries correctly. Can explain what is meant by biodiversity hotspots and mention areas included in the 23 biodiversity hotspot areas appropriately.	4
		Can explain biodiversity at the level of genes, types, and ecosystems, and name one example. Can explain what is meant by megadiversity countries and one of the countries included in it but is less complete. Can explain what is meant by biodiversity hotspots and mention one of the biodiversity hotspot areas but is less complete.	3
		Answer some answers that have to do with understanding the concept of biodiversity, megabiodiversity countries, and biodiversity hotspots.	2
		Answering has nothing to do with understanding the concept of biodiversity, megabiodiversity countries, and biodiversity hotspots.	1

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No.	Indicators	Rubrics	Score
2	Understand the character and distribution of biodiversity areas in Indonesia	Able to understand animal characters and animal distribution in biodiversity areas in Indonesia accurately and completely.	4
		Able to understand animal character and animal distribution in biodiversity areas in Indonesia accurately but incompletely.	3
		Can understand some animal characters and animal distribution in biodiversity areas in Indonesia.	2
		Answer but do not understand the character of animals and the distribution of animals in biodiversity areas in Indonesia correctly.	1
3	Distinguishing the characteristics of flora and fauna biodiversity in Indonesia	Can distinguish the characteristics of biodiversity of flora and fauna in rice fields and in traditional markets appropriately and completely.	4
		Can distinguish some of the characteristics of biodiversity of flora and fauna in rice fields and in traditional markets.	3
		Can only distinguish one characteristic of the biodiversity of flora and fauna in rice fields and in traditional markets.	2
		The answer does not explain the differences in the characteristics of biodiversity of flora and fauna in rice fields and in traditional markets.	1
4	Analysing the causes of biodiversity loss in Indonesia	Can analyze three causes of disappearance of typical animals in East Java precisely.	4
		Can analyze two causes of disappearance of typical animals in East Java precisely.	3
		Can analyze one cause of the disappearance of typical animals in East Java precisely.	2
		The answer does not provide the results of the analysis of the causes of the disappearance of typical animals in East Java.	1
5	Biodiversity conservation efforts in Indonesia	Can explain the three biodiversity conservation efforts in Indonesia carried out by the government or the community, including oneself, appropriately.	4
		Can explain two biodiversity conservation efforts in Indonesia carried out by the government or the community, including oneself, appropriately.	3
		Can explain a biodiversity conservation effort in Indonesia carried out by the government or the community, including oneself, appropriately.	2
		The answer does not explain the biodiversity conservation efforts in Indonesia carried out by the government or the community, including oneself, appropriately.	1

Table 3. Environmental Sustainability Attitude Indicators

No.	Indicators	Statement	Score
1	Enjoyment of nature Scale	(+) When experiencing stress, I choose to spend time in nature.	Strongly Agree: 5
		(-) I feel happier being in a shopping mall than in the woods.	Strongly Disagree: 5
2	Support for interventionist conservation policies	(+) People in developed societies should adopt a more frugal lifestyle for the future.	Strongly Agree: 5
		(-) I disagree with measures that would force industry to use recycled materials if this would make products more expensive.	Strongly Disagree: 5
3	Environmental movement activism	(+) I'm ready to help raise funds for environmental protection.	Strongly Agree: 5
		(-) In the future, I will not engage in environmentalist organizations.	Strongly Disagree: 5
4	Conservation motivated by anthropocentric concern	(+) Nature is important because it can contribute to human pleasure and well-being.	Strongly Agree: 5
		(-) We must protect the environment for the well-being of plants and animals, rather than for the well-being of human beings.	Strongly Disagree: 5

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No.	Indicators	Statement	Score
5	Confidence in science and technology	(+) Humans will eventually learn how to solve all environmental problems.	Strongly Agree: 5
		(-) Science and technology cannot address serious threats to our environment.	Strongly Disagree: 5
6	Environmental fragility Scale	(+) When humans destroy nature, it often leads to disasters.	Strongly Agree: 5
		(-) I don't see any real environmental problems due to rapid economic growth, instead it creates benefits.	Strongly Disagree: 5
7	Altering nature Scale	(+) I prefer a neatly arranged and organized garden to a wild and natural garden.	Strongly Agree: 5
		(-) The grass and wild plants growing between the paving look untidy but natural and should be left alone.	Strongly Disagree: 5
8	Personal conservation behaviour	(+) As much as possible I took a short shower to save water.	Strongly Agree: 5
		(-) I prefer to drive a private car, rather than public transportation.	Strongly Disagree: 5
9	Human dominance over nature	(+) Plants and humans exist for human use.	Strongly Agree: 5
		(-) Man in nature is no more important than other living things.	Strongly Disagree: 5
10	Human utilization of nature	(+) Humans can use nature as a resource for economic purposes.	Strongly Agree: 5
		(-) We should no longer use nature as a resource for economic purposes.	Strongly Disagree: 5
11	Ecocentric concern	(+) It's sad to see the environment destroyed.	Strongly Agree: 5
		(-) I agree with the idea of forests being cleared for agriculture.	Strongly Disagree: 5
12	Support for population growth policies	(+) The world will be better off if its population stops growing.	Strongly Agree: 5
		(-) Married couples should have as many children as they want, as long as they can provide adequately.	Strongly Disagree: 5

3. RESULT AND DISCUSSION

This research is a quasi-experimental study. Learning in the control class is by using the non-field trip method while the experimental learning class uses the field trip method. The application of the field trip method takes longer than learning with other methods. In this study, the allocation of time used for learning with the field trip method is the same as the allocation of time with ordinary learning. The location of the field trip is in the range of 900 m to 2,000 m from the school. Learning with the field trip method is carried out in rice fields and traditional markets. Field trip activities begin with the preparation stage, field trip activities, and reports (Hassan et al., 2022). The average posttest results of biodiversity knowledge and environmental sustainability attitudes can be seen in table 4. The posttest average of the control class was lower than that of the experimental class. Pretest and posttest result data are carried out prerequisite tests, namely with normality and homogeneity tests. The results of the prerequisite test can be seen in table 5.

Table 4 shows the pretest and posttest results of normal distributed biodiversity knowledge. Posttest values of control class biodiversity knowledge and experiments were further tested by homogeneity tests. The homogeneity test results show that the control and experimental classes have a probability (Sig.) of $0.222 > 0.05$, meaning that the posttest results of both classes are homogeneous. The pretest and posttest results of environmental sustainability attitudes in table 4 show normal distribution. Then proceed with the homogeneity test. The homogeneity test results of the control and experimental classes have a probability (Sig.) of $0.191 > 0.05$, meaning that the posttest results of the two classes are homogeneous.

Table 4. Results of Biodiversification Knowledge Assessment and Environmental Sustainability Attitudes

Variable	Result	Control Class	Experimental Class
Biodiversity Knowledge	Average pretest	62	54
	Average posttest	70	80
	Lowest score posttest	45.8	50

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Variable	Result	Control Class	Experimental Class
Environmental Sustainability Attitude	Top marks posttest	100	100
	Average pretest	71	69
	Average posttest	73	77
	Lowest score posttest	61.7	60.8
	Top marks posttest	86.7	90.8

Table 5. Prerequisite Test Results

Variable	Test Type		N	Sig.	Alpha	Information
Biodiversity Knowledge	Normality	*Pretest*	72	0.294	0.05	Usual
	Normality	*Posttest*	72	0.066	0.05	Usual
	Homogeneity	*Posttest*	72	0.222	0.05	Homogeneous
Environmental Sustainability Attitude	Normality	*Pretest*	72	0.085	0.05	Usual
	Normality	*Posttest*	72	0.918	0.05	Usual
	Homogeneity	*Posttest*	72	0.191	0.05	Homogeneous

Knowledge of biodiversity is measured by the instrument of description questions. Question indicators derived from indicators proposed by Aripin et al. (2021) can be seen in table 2. After learning with a field trip, an evaluation was carried out. The evaluation results showed that the class with the field trip method had an average posttest score of 80 while the control class without the field trip method had an average posttest score of 70. The highest score was obtained by all classes and the lowest score was obtained by the control class which was 45.8. Covariance analysis can be seen in table 6. The results show that F count is greater than F table which is 25.674 > 3.12 then H0 is rejected and H1 is accepted, so there is an effect of field trip on biodiversity knowledge. Learning with field trips makes learning more fun and students enjoy nature more. According to Kamudu et al. (2022), students can understand the concept of biodiversity through field study activities, because students can have recreation and learning, and improve critical thinking skills about biodiversity issues. Ubaidillah (2018) also said that the field trip method is able to increase the understanding of science concepts in the case of solving everyday problems. Field trips invite students to (1) understand the material and prepare the material tools needed in field trip activities, (2) conduct field trip activities by observing natural phenomena, conduct interviews with the surrounding community, and work in teams to collect data in the field, and (3) compile reports on the results of field trip activities (Hassan et al., 2022). This field trip is also effective in improving general and special knowledge (Rahayu et al., 2023).

Table 6. Ancova Test Results of Biodiversity Knowledge

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	4370.593[a]	2	2185.297	17.813	.000
Intercept	6052.432	1	6052.432	49.335	.000
PreBio	2516.188	1	2516.188	20.510	.000
Kode	3149.742	1	3149.742	25.674	.000
Error	8464.973	69	122.681		
Total	421232.660	72			
Corrected Total	12835.566	71			

Student environmental sustainability attitudes can arise when students are invited to learn sustainability attitudes by acting directly on the surrounding environment. Students will better understand that all human behavior that is destructive to nature, will have bad consequences that will be felt by humans themselves. Environmental sustainability attitudes are measured by inventory instruments. Instrument inventory is derived from indicators proposed by Milfont & Duckitt (2010). Milfont & Duckitt (2010) suggest twelve indicators that are an assessment of environmental sustainability attitudes, can be seen in table 3. Field trip activities are carried out in two locations, namely rice fields and traditional markets. Rice fields are a means to make students cultivate environmental sustainability attitudes on indicators 1, 4, 5, 6, and 7, such as enjoying nature, fostering an understanding of the importance of nature as a contribution to human pleasure and welfare, learning to solve environmental problems, seeing human damage, and realizing that rice fields are evidence of neatly arranged natural beauty. While traditional markets are places for students to learn environmental sustainability attitudes in indicators 2, 3, 8, 9, 10, 11, and 12, such as seeing developed communities adopt a frugal lifestyle, seeing

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fundraising to help environmental sustainability, saving water use, the use of plants in life, the use of nature by humans as an economic source, seeing the collection of waste in the market, and see the importance of population growth policies.

Table 7. Ancova Test Results of Environmental Sustainability Attitude

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	373.347[a]	2	186.673	4.716	.012
Intercept	1759.274	1	1759.274	44.441	.000
PreSKL	69.946	1	69.946	1.767	.188
Kode	346.667	1	346.667	8.757	.004
Error	2731.480	69	39.587		
Total	407415.120	72			
Corrected Total	3104.826	71			

The results of the assessment of environmental sustainability attitudes showed that the lowest average score between the control class and the experimental class had differences. The control class had a lower average score than the experimental class. In addition, the highest posttest score obtained by experimental class students is 90.8, and the lowest posttest score obtained by experimental class students is 60.8, can be seen in table 4. This can happen because not all students can focus on field trip activities, so not all students can understand about environmental sustainability attitudes that should be. The field trip method can be used well depending on student input. If students have a learning style outside of school with high concentration, then this method is very suitable to be applied. Covariance analysis of environmental sustainability attitudes can be seen in table 7. The results show that F count is greater than F table which is 8.757 > 3.12 then H0 is rejected and H1 is accepted, so there is an influence of field trip on environmental sustainability attitudes. In accordance with the research of Dinata et al. (2018), that the field trip method can have an influence on student attitudes. Field trips invite students to engage directly, visualizing the understanding of biodiversity knowledge and environmental sustainability attitudes they learn in class. Inviting students to interact socially by communicating with the community in traditional markets, collaborating with groups, and fostering empathy for the environment, as well as building student awareness in solving environmental problems. This problem occurs inseparably from human interaction with the environment, both biotic and abiotic environments, as well as low awareness of the environment (Pangestu et al., 2023). This is in line with the research of Hassan et al. (2022), that field trips provide real-world experiences, improve the quality of education, and social relationships outside the classroom. Andriansyah (2020) also said that bringing students to the real world provides them with opportunities to socialize with the world around them and learn to interact in the right way so that they can create better attitudes than just learning in the classroom. Learning directly in nature and interacting socially with the community is very relevant for shaping environmental sustainability attitudes (Hosany et al., 2022). This field trip method can be used as differentiated learning in the curriculum "Merdeka", because according to Mabsutsah et al. (2023) in this curriculum teachers need to adapt and need differentiated learning that can improve the ability to think creatively in students.

4. CONCLUSION

Learning material on the diversity of living things using the field trip method has proven to have an effect on increasing knowledge of biodiversity and student sustainability attitudes. Therefore, the application of the field trip method in learning, especially biology, is highly recommended.

5. ACKNOWLEDGEMENT

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