

## **INQUIRY-BASED ENVIRONMENTAL LITERACY TO IMPROVE ENVIRONMENTAL CHARACTER CARE OF ELEMENTARY SCHOOL STUDENT**

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**Abstract:** *The purpose of this study was to determine the effect of inquiry-based environmental literacy used in learning on the environmental care character of third grade students at MI Al Muhsin 1. This research method uses a quantitative approach with a quasi-experimental research model. In this study, learning tools were developed in the form of lesson plans and student worksheet. The instrument used in this research is a character questionnaire that cares about the environment. Data analysis using t-paired test. Based on the findings, the value of the environmental care character of the students after the treatment was higher than the environmental care character before the treatment. Based on the results of the Paired Sample t-Test statistical test, the significance value was 0.000 or sig. (2-tailed) < 0.05. Thus it can be said that at the 95% confidence level, there is a significant difference in the value of the environmental care character of students before being given treatment and after being given treatment. Inquiry-based environmental literacy learning facilitates students to spread nature, recognize the ecosystem around where they live, understand the damage that occurs in the environment, and be creative with plastic waste.*

**Keyword:** *Environmental Literacy. Inquiry, Environmental Care Character*

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## INTRODUCTION

Indonesia is a country rich in diversity of biota, both plants and animals. Waters in the Eastern Region of Indonesia like Sulawesi, Nusa Tenggara Islands, Bali, Maluku Islands and Papua, included in the region *World Coral Triangle*, namely the area with the highest diversity of marine biota in world (<http://www.oseanografi.lipi.go.id/shownews/208>). Besides that Indonesia has very large tropical rain forest. Indonesia's forests have potential which is very large, reaching 99.6 millions hectares or 52.3% of the area Indonesia (<https://sourcelearning.learning.kemdikbud.go.id/sourcelearning/shown/PotensiSumber-Alam-2016/menu2.html>).

The wealth of biota in Indonesia must be balanced with the enthusiasm of our younger generation in preserving it. The fact happening today is the environmental damage that has occurred in Indonesia, including the destruction of forests.

It is a challenge for today's generation to manage the environment, so that it can preserve the environment as well as possible. Good environmental management can guarantee the availability of natural resources. One of the efforts to overcome the environmental crisis is through education. By learning science, students are expected to experience a positive attitude change, so that they can also have a positive impact on the environment.

Students need to be provided with good knowledge and knowledge about the environment. Students should instill a sensitive and caring attitude towards the environment, so that students are able to pay attention to current environmental conditions and think about maintaining the sustainability of a good environmental carrying capacity. Improving the environmental literacy skills of students is very much needed. Environmental literacy is the ability of each individual to behave well in their daily lives by using their understanding of environmental conditions. Environmental literacy provides

knowledge so that they can use knowledge to make the right decisions about environmental problems (Hollweg, 2011). Increasing environmental literacy means preparing people who understand and can overcome environmental problems, so that environmental agents can be prepared who have a caring attitude towards the environment. As stated by (Fuady, 2016) various environmental damage both on land and at sea are caused by the lack of human care for the environment.

Inculcating environmental literacy to students can be done with the inquiry learning model. Inquiry learning model is defined as a process to obtain information through observation or experimentation to solve a problem by using critical and logical thinking skills (Kusumaningrum, 2021). So the planting of environmental literacy with the inquiry learning model is expected to increase the sensitivity and concern of students in dealing with environmental problems. In addition, students can become individuals who are able to think of solutions to existing environmental problems.

Teachers in elementary schools can strengthen the character of caring for the environment in students through learning. One way for teachers to instill an attitude of caring for the environment is by preparing the right method in learning (Wulandhari, 2019).

Science learning in elementary schools is generally more focused on children's cognitive, so children are more likely to memorize. This learning method causes students to know many terms by rote without meaning (Muthmainah, 2016). Science education should be delivered contextually, so that it can improve the environmental literacy of students. Schools are not separated from the community because the curriculum provides a planned learning experience in which students apply what is learned in school to the community and utilize the community as a learning resource. It is hoped that students will not only understand science material, but also

understand and be able to apply science material in everyday life. The application of environmental literacy based on the inquiry learning model is very appropriate to instill and foster an attitude of caring for the environment. Children can export their own learning experiences so they can better understand existing environmental conditions and problems. This is also stated by (Febriana, 2016) which states that the inquiry model is appropriate for environmental understanding.

## **LITERATURE REVIEW**

### ***Environmental Literacy Berbasis Inquiry***

Developing an environmentally conscious society is possible through effective environmental education. As places of learning, schools have a special role to play in helping students to understand our impact on the planet; and become a place where sustainable living and work is demonstrated to youth and society (Ozsoy, 2012). We can describe the environment as something that affects humans and all external conditions. Although the cause of environmental problems is human, the solution to this problem is also human. Teaching people about the environment is the most important thing for the solution of environmental problems (Ozgurler, S & Cansaran, 2014)

As a developing concept, environmental literacy has been understood as the main result of environmental education (Srbnovski, M., Erdoan, M. & Ismaili, 2010). Environmental literacy provides knowledge in order to be able to use knowledge to make the right decisions about environmental problems (Hollweg, 2011). According to (Coyle, 2005) environmental literacy is the ability to understand and interpret the health of environmental systems and be able to take action to improve and maintain these systems. According to him environmental knowledge involves a combination of awareness and action that encourages people to engage in direct personal

behaviors that contribute to environmental improvement such as saving electricity, gasoline, and water, buying "green" products (including seafood options), reducing solid waste, and reducing waste. pollution pollution caused by individuals. Environmental literacy is not only concern and knowledge, but the depth of information and skills (think and do) of what is conveyed.

The Environmental Literacy Task Force (2015) revealed that environmental literacy includes knowledge, capacity to continuously learn and seek knowledge, and skills needed to use knowledge. An environmentally literate person has the ability to act individually and with others to support a healthy, prosperous and just ecology for present and future generations. Through everyday experiences and educational programs that include classroom-based learning, experiential education, and out-of-class learning, students will become environmentally literate, develop knowledge, skills, and understanding of environmental principles to analyze environmental issues and make informed decisions. (Karimzadegan, H & Meiboudi, 2012) defines environmental literacy as the capacity to understand and interpret the health of environmental systems and to take appropriate actions to maintain, restore, or improve the health of these systems. The achievement of environmental literacy is that everyone can understand and experience that they can be part of the solution (NEEF, 2015). According to him, a person who has environmental literacy is someone who, either individually or together with others, makes decisions based on information about the environment; willing to act on these decisions to improve the well-being of individuals, society and the rest of the global environment; and participate in social life. The higher a person's environmental literacy, the more prepared he or she is to deal with environmental problems effectively. Based on these understandings, it can be synthesized that

environmental literacy is the ability to understand environmental problems and take action using their knowledge to analyze environmental issues and be able to make the right decisions regarding existing environmental problems.

### 1. Inquiry Learning Model

One of the factors that influence the low learning outcomes is that it is not appropriate in choosing the learning model (Nasreen, 2013). In its application, the learning model must be carried out according to the needs of students because each model has different goals, principles and main emphasis (Andrini, 2016).

The inquiry learning model affects students' thinking patterns and skills so that students can present challenging ideas/thoughts in learning (Rejeki,

Suprapti & Riyadi, 2021). The inquiry learning model is a learning model that prioritizes student activities, so that they are able to develop their potential to the maximum (Hasanah, 2020).

The syntax of the Inquiry Learning Model according to (Meika, 2016) is 1) observation; 2) manipulation; 3) generalization; 4) verification; and 5) application. Meanwhile, according to (Banawi, 2019) the syntax of the Inquiry learning model is to formulate questions, plan, collect and analyze data, draw conclusions, as well as application and follow-up. The syntax of the inquiry learning model in this study is 1) orientation, 2) formulating problems, 3) formulating hypotheses, 4) collecting data, 5) testing hypotheses 6) formulating conclusions.

Table 1. Syntax of the Inquiry Learning Model

Syntax	Description
Orientation	Students are invited to tadabbur the nature and get to know the ecosystem around where they live
Formulating the Problem	Picture/video of ecosystem damage is displayed, Students are asked to observe and observe (human-caused ecosystem damage)
Formulating Hypotheses	Students are asked to formulate hypotheses about the causes of ecosystem damage that occur in pictures/videos
Collecting Data	Several snippets of articles are presented that explain the causes of ecosystem damage, students are asked to look at the articles and write down on the observation table who is the cause of ecosystem damage in each article.
Testing Hypotheses	Students are invited to compare their hypothesis with the data collected regarding the causes of ecosystem damage
Formulating Conclusion	Based on the data obtained, students are guided to formulate conclusions

### 2. Environmental Care Character

Character Caring for the environment is something that must be applied by every level of education in schools. Every school member must have the character of caring for the environment by improving the quality of the environment, increasing awareness of school residents regarding the importance of caring for the environment and taking initiatives to prevent environmental damage (Masturoh, 2020). Caring for the environment is an attitude and action

taken as an effort to prevent damage to the surrounding natural environment and to repair existing damage (Ismail, 2021). Almost all subjects at the basic education level are currently still evaluating aspects of cognitive competence. The affective and psychomotor aspects have not been maximally implemented (Purwanti, 2017)

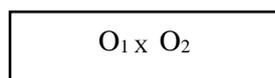
According to (Irfianti, et al, 2016) indicators of environmental care character can be described as efforts to prevent environmental damage and efforts to repair existing environmental damage. Efforts to prevent environmental damage include;

environmental care to keep it clean and tidy, reduce the use of plastic, separate plastic according to its type and save energy. Meanwhile, efforts to repair environmental damage can be done by reforestation and reuse of used goods. The indicators of environmental care character in this study are maintaining environmental cleanliness, disposing of waste in their friends, recycling plastic waste, caring for the environment, and being aware of reforestation.

### RESEARCH METHODOLOGY

This study uses a quantitative approach with a quasi-experimental research model. Quasi-experimental research is an experimental research in which not all variables or experimental conditions can be fully controlled. The research design used a one group pretest posttest design. This study uses one class, where students are first given a pretest. After the pretest, the students were given treatment, namely learning with the theme "Knowing the ecosystem around us" with the inquiry learning model.

Tabel 2. Research Design One Group Pretest Posttest



Information:

$O_1$  = Pretest Score

X = Environmental literacy treatment with the Inquiry learning model

$O_2$  = Posttest score

This study aims to determine the effect of inquiry-based environmental literacy used in learning on the environmental care character of third grade students at MI Al Muhsin 1. The population of this study was all third grade students at MI AL Muhsin academic year 2021/2022.

Selected 1 class with cluster random sampling technique for this study.

Data analysis using t-paired test. Before testing the hypothesis, a prerequisite test of the hypothesis is carried out which includes tests for normality and homogeneity. After prerequisite test. The hypothesis is fulfilled and the data is declared normal and homogeneous, then the hypothesis test is carried out, namely the t-paired test. The t-paired test was chosen because the data is paired data from the same population. Based on the results of the t-paired test, if the results of  $t_{count} < t_{table}$ , it can be concluded that there is no difference in the character of caring for the environment between the pretest and posttest.

This study uses two variables, namely the independent variable and the dependent variable. The independent variable in this study is inquiry-based environmental literacy, while the dependent variable is the character of environmental care. In this study, learning tools were developed in the form of lesson plans and student worksheet. The data needed in this study is the data of the environmental care character of the students. The results of the environmental care character of the students were obtained with a questionnaire instrument. Questionnaire in the form of positive and negative statements related to the caring character of students. The statement items in the environmental care character questionnaire are 20 items. Environmental care character questionnaires were given before and after the inquiry-based environmental literacy treatment, namely learning the environment around us using the inquiry learning model. The lattice of the environmental care character questionnaire instrument can be seen in Table 3.

Tabel 3. Environmental Care Character Questionnaire Points

No	Indicator	Statement	
		Positive	Negative
1	Keep the environment clean	I like to sweep the yard	I'm lazy to clean the windows of the house
		I am happy if the home or school environment is clean from scattered garbage	I just let it go when I saw used bottles scattered in the yard
2	Dispose of trash in its place	If the trash I throw falls out of place, I'll pick it up and put it back in the trash	I mix wet waste and dry waste when taking out the trash
		I feel proud if I throw trash in the trash	I like throwing garbage in the river
3	Recycling plastic waste	I like to recycle used plastic waste into more valuable things	I like to buy bottled drinks instead of bringing my own drink
		I like to make handicrafts from used mineral water bottles	I just throw the used mineral water bottle in the backyard
4	Caring for the Environment	I like to draw on paper instead of dirtying the table or wall	I like to scribble on the walls of the house
		When I see a scribble on the study table, I clean it	When studying I like to scribble on the desk
5	Be aware of greenery	I like to plant trees around the house	I like trampling plants in my yard
		I like watering plants	I let the plant dry without watering it

The syntax for inquiry-based environmental literacy learning in this study is 1) orientation, 2) formulating problems, 3) formulating hypotheses, 4)

collecting data 5) testing hypotheses 6)formulating complete conclusions can be seen in Table 4.

Table 4. Inquiry-Based Environmental Literacy Learning Syntax

Syntax	Description
Orientation	Students are invited to nature tadabbur and get to know the ecosystem around where they live
Formulating the Problem	Picture/video of ecosystem damage is displayed, Students are asked to observe and observe (human-caused ecosystem damage)
Formulating Hypotheses	Students are asked to formulate hypotheses about the causes of ecosystem damage that occur in pictures/videos
Collecting Data	Several snippets of articles are presented that explain the causes of ecosystem damage, students are asked to look at the articles and write down on the observation table who is the cause of ecosystem damage in each article.
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## RESULT AND DISCUSSION

### A. Ability to think critically

The environmental care character of the students is obtained from filling out the environmental care character questionnaire given to the students. Questionnaires were given at the beginning before the treatment was carried out as a pretest and after the treatment was carried out as a posttest. The results of the pretest were used to analyze the character of the students' initial environmental care before being given treatment. The results of the pretest can be seen in Table 5.

Table 5. Pretest Results of Students' Environmental Care Characters

The highest score	90
The lowest score	45
Mean	60
Standard Deviation	11,9

Results from Table 5. It can be seen that the average of the environmental care characters of 20 students is 60, with the highest score of 90 and the lowest score of 45 with a standard deviation of 11.9. From these results, it can be seen that the students' environmental care character is still lacking.

After being given the pretest, treatment was then given, namely learning with the theme "Let's Take Care of the Surrounding Ecosystem" using an inquiry learning model. There are activities in learning the application of environmental literacy using the inquiry learning model, in full it can be seen in Table 6.

Table 6. Learning Activities with the Theme "Let's Take Care of the Surrounding Ecosystem"

Activities to-	Activities
1	Get to know the Surrounding Ecosystem
2	Ecosystem Damage
3	Become an Environmental Police
4	Designing Simple Tools
5	Let's be creative

Activity 1 "Knowing the Surrounding Ecosystem" students are invited to practice nature and recognize the ecosystem in the environment around where they live. Students are invited to observe the ecosystem around where they live and then tell/describe how the condition of the ecosystem around their place of residence is. In addition, they were asked to analyze the components of the ecosystem.

Activity 2 "Ecosystem Damage" students are invited to observe the damage to the ecosystem in the picture. Then they were asked to analyze the cause of the damage (formulate a hypothesis). In addition, several articles related to the damage to ecosystems in Indonesia were also presented. Based on the article, students were asked to compare their hypothesis with the facts.

Activity 3 "Becoming an Environmental Police" students are invited to become police officers in the neighborhood where they live. Students are guided to investigate the condition of the ecosystem around where they live. They were then guided to write reports related to the results of their investigations. They were also asked to reflect on which actions include caring for the environment and which ones damage the environment.

Activity 4 "Designing Simple Tools" students in this activity are asked to design simple tools that function to keep the environment clean. They were asked to make designs and draw them on HVS paper. After that they were also guided to make presentations related to the designs they had made.

Activity 5 "Let's Be Creative" students are asked to be creative using used plastic bottles that are in the environment around where they live. The purpose of this activity is to reduce the amount of plastic waste in the environment. As it is known that this plastic waste is waste that is difficult to decompose. As stated by (Gunadi, 2021) that plastic is waste that is difficult to decompose in the environment by the soil. By converting used plastic

bottles into a work of art, in addition to reducing plastic waste, it will also increase the value of the used plastic bottles. This is in line with the opinion (Nofiyanti, 2020) Plastic is not only a source of problems but on the other hand plastic waste actually provides business opportunities if it is converted into a work of art.

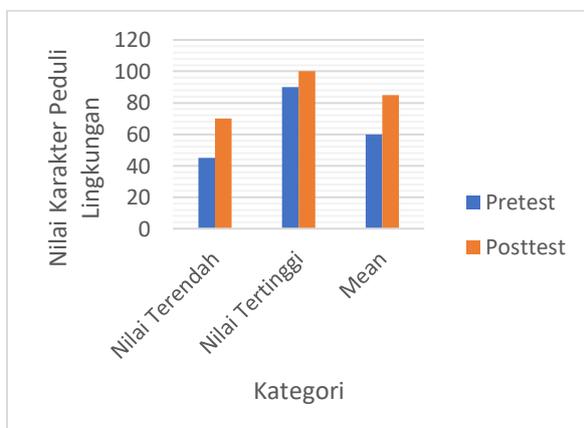
After being given the treatment, the students were then given a posttest, which was asked to fill out a character questionnaire that cared about the environment. The results of the students' posttest can be seen in Table 7.

Table 7. Posttest Results of Students' Environmental Care Characters

The highest score	100
The lowest score	70
Mean	85
Standard Deviation	9,8

Based on the posttest results in Table 7, it can be seen that the average environmental care character of students is 85 with the lowest score of 70 and the highest score of 100. The average value of the environmental care character of these students increases when compared to the pretest score. More details on the comparison of environmental care character values between pretest and posttest can be seen in Figure 1.

Figure 1. Diagram of the Character Value of Caring for the Environment of Students



The statistical t-paired test was conducted to find out whether there was a

significant difference between the results of the pre-test and the results of the post-test of the students' environmental care character. Prior to the t-paired test, the hypothesis prerequisite test was conducted, namely normality and homogeneity tests. The results of the normality test and homogeneity test can be seen in Table 8.

Table 8. Hypothesis Prerequisite Test Results

Hypothesis Prerequisite Test	Significance value
Normality test	0.533

Based on the results of the hypothesis prerequisite test in Table 8, it is known that in the normality test the significance value is 0.533 or (Sig.) > 0.05. This shows that the data is normally distributed. After fulfilling the hypothesis prerequisite test, the hypothesis test is then carried out using the t-paired test. The t-paired test was carried out to find out whether there was a significant difference in the value of the environmental care character of students before being given treatment and after being given treatment. The results of the t-paired test can be seen in Table 9.

Table 9. T-Paired Test Results

Variable	Sig.(2-tailed)
The Value of Caring for the Environment	0.000

Table 9. Shows that, based on the results of the Paired Sample t-Test statistical test, the significance value is 0.000 or sig. (2-tailed) < 0.05, so H0 is rejected. Thus it can be said that at the 95% confidence level, there is a significant difference in the value of the environmental care character of students before being given treatment and after being given treatment.

Increasing environmental literacy for elementary school students can be done in various ways through the learning process. The integration of the learning process with environmental education can develop a person's sensitivity to the environment. The knowledge embedded in students will

affect their attitude towards the environment which will be realized in an action (Littledyke, 2006).

Only individuals who have literacy, awareness, and sensitivity will contribute in dealing with environmental problems. Therefore, inculcating environmental literacy from within students is very important so that they can become agents of environmental reform who can overcome environmental problems through their action plans (S, 2011). This is reinforced by previous research conducted by Amini with the results that a prospective elementary school teacher can improve mastery of concepts, performance, and attitudes and behavior of caring for the environment by applying outdoor-based learning (Amini, 2010). In line with this, compulsory extracurricular programs such as scouting also contributed to increasing environmental literacy by 47% and students' attitudes towards the aquatic environment by 52% with ecological-based environmental activities (Tumise, 2007). Learning activities such as enrichment programs with e-learning systems can also support enrichment activities as well as teaching materials containing information on environmental issues that can improve the student's environment (Haske & Wulan, 2015).

## CONCLUSION

In this article, the author has explained about inquiry-based environmental literacy that is applied in learning. The learning carried out with the theme "Let's Take Care of the Surrounding Ecosystem" teaches students to recognize, care for and care about the surrounding environment. Based on the findings, the value of the environmental care character of the students after the treatment was higher than the environmental care character before the treatment. Inquiry-based environmental literacy learning facilitates students to spread nature, recognize the ecosystem around where they live, understand the damage that occurs in the

environment, and be creative with plastic waste.

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