



# Environmental Literacy of Junior High School Students in Bogor: Contribution of Knowledge to Environmental Attitudes and Behaviors

Nadila Fetiana<sup>1</sup>, Anna Permanasari<sup>1\*</sup>, Irvan Permana<sup>1</sup>

<sup>1</sup>Pendidikan IPA, Sekolah Pascasarjana, Universitas Pakuan, Bogor, Jawa Barat, Indonesia.

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Corresponding Author:

Anna Permanasari

[anna.permanasari@unpak.ac.id](mailto:anna.permanasari@unpak.ac.id)

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**Abstract:** This study aims to analyze students' environmental literacy levels through survey methods and determine the relations between each environmental literacy indicator. The research sample was 80 junior high school students in Bogor. The collection technique was carried out using environmental literacy instruments adapted from the Middle Schools Environmental Literacy Survey/Instrument (MSELS/I) questions by NELA with modifications to the context of environmental pollution. Data acquisition was transformed and interpreted using the NELA transformation method. The results showed that students' environmental literacy was still low; knowledge (23.2%) is in the medium category, cognitive skills (11.4%) are in the low category, environmental attitudes (40.8%) is in the medium category and environmental behavior (22.2%) is in the low category with the results of achieving the entire student literacy domain of 97.8 (low). The results of further research show that there is a relation between knowledge and attitudes, knowledge with behavior, and attitudes with behavior, and there is no relation between cognitive skills and knowledge, attitudes and behaviors. A considerable contribution from other factors that affect each indicator of environmental literacy will be a chance for follow up research.

**Keywords:** Environmental literacy; Contribution; NELA

## Introduction

Environmental problem is a serious topic to follow up on because they can cause various problems that threaten human life. Data from the Ministry of Environment and Forestry of the Republic of Indonesia (KLHK) shows that the value of the Indonesian Indeks Kualitas Air (IKA) has not met the RPJMN target of 55.1. In addition, based on data compiled from the World Air Quality Report, Indonesia's IKU (Indeks Kualitas Udara) value is still ranked 9th out of 167 countries in the world and ranked number 1 in Southeast Asia with the highest level of air pollution worth an index of 40.7. The low number of the index shows that until now the quality of our environment still cannot be said to be good. This happens because of the low public awareness and knowledge of the importance of the environment which has an impact on human indifference (Yilmaz & Can, 2020) and (Syofyan et al., 2020). Agustin & Maisyaroh (2020) mentioned that the good and bad of an

environment is due to low knowledge, attitudes and behaviors of caring for the environment, where these three abilities are included in environmental literacy skills. It can be said that a clean and healthy environment depends on the environmental literacy that a person has (Widowati, 2011). People who have environmental literacy will have respectable behavior and are responsible for the environment (Ramdas & Mohamed, 2014). Hollweg et al. (2011) revealed that the purpose of environmental literacy is to prepare a sustainable generation who understands, can overcome environmental problems and has a positive sustainable attitude and action towards the environment by not damaging the current environment for future needs. The establishment of environmental literacy in each of these domains can be developed through environmental education packaged in the Education for Sustainable Development (ESD) framework. ESD was born from the need for education to answer environmental challenges that continue to develop to date (Segera, 2015).

## How to Cite:

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In Indonesia, research on environmental literacy analysis has been carried out quite a lot, including research by Santoso et al. (2021) on environmental literacy analysis in junior high school students, Nugraha et al. (2021) on the disparity in environmental literacy of elementary school students in Bogor, Mardiani et al. (2020) on the environmental literacy of students in the modern Islamic boarding school al-rifa'i, Malang Regency based on Indonesia about gender differences and parental work, Nasution (2021) on the analysis of the level of environmental literacy of FKIP students with NELA score, Aini et al. (2021) on the analysis of student environmental literacy levels on the local content of life-sustaining education, Rokhmah & Fauziah (2021) environmental literacy analysis of junior high school students in schools with environmental insights, Yusup (2021) environmental literacy profiles of prospective science teacher students, and Nasution, (2016) regarding the analysis of Environmental Literacy Abilities of Class X High School Students in Samboja in Biology Learning.

Based on this analysis, it is known that environmental literacy measurements can be carried out at various levels of education such as elementary, junior high, high school and university. Environmental literacy analysis research is most widely carried out on primary education students. This happens because environmental literacy education is important to be instilled in school-age children, so these skills can be embedded into a strong character (Kusumaningrum, 2018).

In several previous studies known to measure environmental literacy, some researchers used instruments adapted from the Middle Schools Environmental Literacy Survey/Instrument (MSELS/I) questions. MSELS/I is a basic instrument of environmental literacy measurement developed by Hungerford, Volk, Bluhm, McBeth, Meyers, and Marcinkowski in 2008 and later revised for use in the National Environmental Literacy Assessment Project or NELA (McBeth et al., 2008). MSELS/I is widely used because the MSELS/I instrument has been tested for both validity and reliability, and has become a reference for the assessment or evaluation of standards for environmental literacy tests in several countries, so that the question is a standard question that is often used (McBeth & Volk, 2010).

Furthermore, the results of previous studies show that the transformation of the scores used tends to be diverse. National Environmental Literacy Assessment (NELA) is a scoring transformation method used for middle-class students (Hollweg et al., 2011). However, environmental literacy research in junior high school students conducted by Santoso et al. (2021) and Rokhmah & Fauziah (2021) has not used the NELA transformation method in their calculations (Hollweg et al. 2011). State population characteristics must

correspond to the method and way of the assessment given. Therefore, the use of MIELS carried out by NELA and the NELA transformation method is appropriate if it is carried out in grade VIII junior high school students because students are at the high school level with an age of under 15 years.

Given the importance of environmental literacy during the current poor conditions, researchers have conducted a study with a focus on the level of environmental literacy of junior high school students to strengthen previous research on the adoption of MIELS /I instruments and the transformation of NELA in determining the level of environmental literacy in middle-class students and want to know how much interrelation and contribution of each indicator of environmental literacy is.

**Method**

The method used in this study is the survey method. The research sample used was 80 students of class VIII junior high school with details of 17 men and 63 women. The instruments used were interviews and environmental literacy instruments adapted from the Middle Schools Environmental Literacy Survey/Instrument (MSELS/I) used by NELA with modifications to the content of environmental pollution. The types of instruments used include multiple-choice questions for the knowledge domain, essays for the skill domain and questionnaires with the Likert Scale for the attitude and behavior domains. The instrument is deployed online using the help of Google form. The data obtained are then analyzed and interpreted using the National Environmental Literacy Assessment (NELA) transformation technique so it can be describe the conditions that occur in the research subjects (Hollweg et al., 2011). The environmental literacy instrument is adapted from the Middle Schools Environmental Literacy Survey/Instrument (MSELS/I) used by NELA with modifications to the content of environmental pollution. The grid of environmental literacy tests can be seen in table 1.

**Table 1.** Grids on Environmental Literacy Questions

Environmental Literacy Domain		Aspects	
Knowledge	1	Environmental Knowledge	
	Cognitive Skills	1	Issue Identification
		2	Issue Analysis
Attitude	3	Issue Inquiry Plan	
	1	Thinking about the Environment	
	2	Environmental Sensitivity	
Behavior	1	Feelings for the environment	
	2	Environmental responsibility	

The raw scores of the test results are then interpreted into certain criteria using the NELA

transformation method which can be fully seen in the following table 2.

**Table 2.** Methods of transforming the raw scores of NELA environmental literacy test results.

Domain	Range	Criteria
Knowledge	0-60	(0 - 20) Low
		(21 - 40) Medium
		(41 - 60) High
Cognitive Skills	0-60	(0 - 20) Low
		(21 - 40) Medium
		(41 - 60) High
Attitude	15-60	(15 - 30) Low
		(31 - 45) Medium
		(46 - 60) High
Behavior	12-60	(12 - 27) Low
		(28 - 44) Medium
		(45 - 60) High

The transformation results obtained on each domain are then processed and converted into percentages with the following equation 1:

$$\frac{\text{The number of scores obtained}}{\text{Number of students}} \times 100 \tag{1}$$

To measure the achievement of the entire literacy domain used qualification scores as follows Nella:

**Table 3.** Level of Environmental Literacy Achievement

Level of achievement	Qualification
27 - 98	Low
99 - 169	Medium
170 - 240	Low

To find out the interrelations and contribution values in each environmental literacy indicator, a correlational analysis was carried out including prerequisite tests consisting of normality and linearity tests. After the data were said to be normal and linear, a simple linear regression test and pearson product moment test were carried out using SPSS 26. The results of the analysis will later show the presence or absence of relations and the closeness of the relation between knowledge, cognitive skills, attitudes and environmental behavior (Arikunto, 2010).

## Result and Discussion

Environmental literacy is a person's ability to understand and interpret environmental conditions so that they can decide on appropriate actions in maintaining, improving and increase environmental conditions (Liang et al., 2018). Environmental literacy aims to be able to prepare environmentally conscious humans to overcome environmental problems that occur (Kusumaningrum, 2018) and (Sari et al., 2020). The

following are the results of the student's environmental literacy level test presented in table 4.

**Table 4.** The level of achievement of environmental literacy

Domain	Achievement (%)	Qualification	Total Score of Environmental Literacy
Knowledge	23.2	Medium	97.89 (Low)
Cognitive Skills	11.4	Low	
Attitude	40.8	Medium	
Behavior	22.2	Low	

Based on the results of the environmental literacy achievement level test, an overall achievement of 97.8 was obtained, which the results showed that the student's environmental literacy was low. The results of the achievements in each indicator show that the domain of knowledge and attitudes is in the medium category while cognitive and behavior skills are in the low category. These results are in line with research conducted by Hariyadi et al. (2021), Farwati et al. (2017) and Ozgurur & Cansaran (2014) that the percentage achievement in the indicator of knowledge, cognitive and behavior skills are lower than the achievement of environmental attitude indicators.

In the domain of knowledge, a good level of student knowledge is influenced by several factors including previous knowledge, experience, sources of information, environment and the role of parents (Silalahi et al., 2016). This is in line with what happened on the ground. The research sample is a class VIII student who has studied environmental material and environmental pollution in the previous year. In addition, nowadays the process of searching for information related to the environment is very easy.

In the attitude domain, the results of moderate achievement on environmental attitudes obtained show that some students already have sensitivity and ability to think about the environment quite well, as evidenced by the acquisition of attitude values in every aspect. Wulandari & Sulistiyowati (2017) stated that good knowledge can affect the attitude toward caring for the environment in a good direction. In the attitude domain, the results of moderate achievement on environmental attitudes obtained show that some students already have sensitivity and ability to think about the environment quite well, as evidenced by the acquisition of attitude values in every aspect. This is in line with the results of the achievement of knowledge and attitudes of students who are in the moderate category. In addition, several factors affect attitudes towards the environment, including personal experience, culture, significant other, information, educational/religious institutions and emotional factors in individuals (Widianingrum, 2021)

The next result, the level of achievement in the domain of cognitive skills is low. This shows that the majority of students do not have good cognitive skills. This is evidenced by the large number of students who answer questions without reason or for improper reasons and the unfamiliarity of students in carrying out a problem-solving process that demands a high level of thinking skills. Low cognitive skills can also be due to the low quality of the student's learning experience. Students lack the opportunity to interact directly with environmental problems that occur around them (Rokhmah & Fauziah, 2021).

The last is the domain of behavior with low achievement results. The low achievement results are caused by the low results of environmental behavior

scores on environmental responsibility aspects. The low score gained on the aspect of environmental responsibility illustrates that students have not been able to contribute and interact well with environmental sustainability and do not have the motivation to prevent damage to the environment (Suryanda et al., 2020). Factors that can influence student environmental behavior include family factors, habits, friendly environment, association and information (Istiana et al., 2020), factors of condition, personality and relation with nature (Krajhanz, 2010), as well as factors of facilities, the role of parents and the surrounding environment (Suryani, 2018). Based on the results of the study, the interrelation between each indicator of environmental literacy can be shown in the following figure 1.

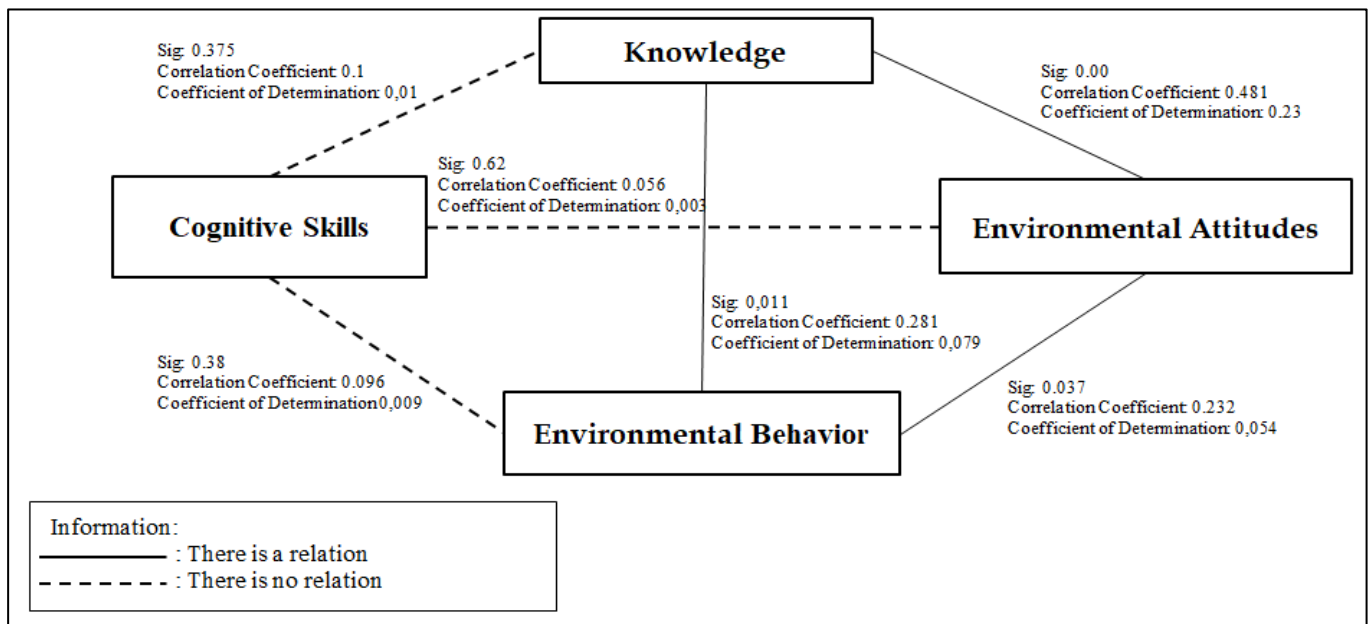


Figure 1. Interrelation of Environmental Literacy Indicators

The figure above shows that there is a positive and significant relation between knowledge with environmental attitudes, knowledge with environmental behavior and environmental attitudes with environmental behavior, evidenced by a sig value of less than 0.05 and a calculated r-value of more than r table (0.220). The highest positive correlation value is found in the relation between knowledge and environmental attitudes with a pearson correlation value of 0.481 (medium), a sigma value of 0.00 and a coefficient of determination of 0.23 which means that knowledge directly contributes to a person's environmental attitude by 23%. These results are following the results of research by Zheng et al. (2018), Darmawan & Fadjarajani (2016) & Ahmadi et al. (2018) which state that there is a positive relation between knowledge and environmental attitudes, so that a person's knowledge will affect his environmental attitude.

Febriasari & Supriatna (2017) in their journal reveals environmental knowledge is very important because it helps individuals in gaining a basic understanding of the environment and the problems associated with it. The results of this understanding help to arouse attention among individuals, thus creating environmental attitudes in the form of sensitivity, a sense of concern, and a desire to act on the surrounding environment. In addition, Liefländer & Bogner (2018) reveal that knowledge can change a person's values and perspectives on the environment so that it affects attitudes.

Based on the results of the correlation test output in figure 1, there is no relation between cognitive skills with the knowledge, attitudes and behavior of the student's environment. This is shown by the acquisition significance value is more than 0.05 and a calculated r-value is less than r table (0.220). Cognitive skills are skills derived from the intelligence of the human mind that

reoccurs internally in the brain to understand, recognize, give rational reasons, reason and solve problems (Nayazik et al., 2019). Knowledge is the basis for the formation of cognitive skills Sheromova et al., (2020) and Finn et al., (2014), but good knowledge does not guarantee good cognitive skills, because cognitive skills put forward a higher level of learning and thinking experiences that can be trained through habituation in learning.

Research conducted by Mackey et al. (2017) revealed that there was a positive correlation between knowledge and cognitive skills in the control class study group that carried out deck card-assisted game learning activities. The learning is proven to be able to train students' ability to remember, solve problems, reason and speed of knowledge processing, so they can provide learning experiences and be able to train and develop their cognitive abilities well. The research is in line with the results in this study which revealed that there was no relation due to the lack of learning experience felt by students (Rokhmah & Fauziah, 2021). This is because so far learning activities have only focused on efforts to increase knowledge, so that students have difficulty in practicing problem-solving and internalization skills which have an impact on the low value of cognitive skills.

Furthermore, the absence of a relation between cognitive skills indicators with attitudes and behaviors can occur because cognitive skills are skills that only in a person's thinking and cannot be actualized into attitudes or behaviors. As is known, it takes a fairly long process and time in shaping a person's behavior as well as attitudes (Notoatmodjo, 2013).

Several studies have revealed that cognitive skills are not the only factor related to the attitudes and behaviors of a person's environment, so there is a considerable contribution from other factors that influence attitudes and behaviors. Jauhari (2018) and Bronfman et al. (2015) in their research revealed that age, level of education, income and gender are factors that can influence a person's environmental attitudes and behavior. In addition, research conducted by Barr (2007) and literature studies by Li et al. (2019) revealed that situational factors consisting of circumstances, sociodemographic, facilities, experiences, and interventions instruments as well as psychological factors consisting of personal perceptions, motivations, norms, attention and psychology are also factors that can influence the attitudes and behavior of a person's environment.

The low percentage of achievement results and the absence of a relation in some indicators of shiva environmental literacy are challenges that need to be used as a concern to be overcome in the world of education.

## Conclusion

The results of the study stated that the level of student environmental literacy was in the low category with details of moderate achievement on knowledge and attitude indicators and low achievement for indicators of cognitive skills and environmental behavior. The results of the correlational test on each environmental literacy indicator show that there is a positive relation between knowledge and attitudes, knowledge with environmental behavior and attitudes with student environmental behavior and there is no relation between cognitive skills and student environmental knowledge, attitudes and behavior.

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