The Effect of Environmental Education on Students' Environmental Care Attitude: A Meta-Analysis Study

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Abstract

This study aims to determine the effect of environmental education on environmental care attitudes of students based on levels of elementary school, junior high school, and senior high school, and the influence of environmental education based on indicators of students' environmental care attitude. This research method is a meta-analysis with a sample of 10 articles (6 national journals and 4 international journals). The instrument used in this study was a collection of research journals with the same research topic and given a code for each journal. Based on the results of the study, it is concluded that 1) the effect of environmental education at the SMA level (0.82) is higher than that at the SD level (0.21) and SMP (0.48); 2) the effect of environmental education has a moderate effect (0.50) in terms of the students' environmental care attitude; 3) the application of environmental education is more effective at the senior high school level.

Keywords: Environmental Education; Students' Environmental Care Attitude; Meta-Analysis

Introduction

Education is a means of learning and developing the character of an individual as a learner. Through education, an individual learns to be better, from being unable to be able, from not knowing to know, and all other changes through the development process. Education is also used as a benchmark for the progress of a nation, one of which is to improve human resources, therefore it acts as one of the factors influencing the development of a country (Setiawan, 2015; Setiawan, Rachmadtullah, et al., 2020). According to Law Number 20 the Year 2003, the purpose of national education is to develop capabilities and shape the character and civilization of the nation with dignity.

Education in Indonesia is grouped into various levels based on formal, informal, and non-formal education. Formal education comes from the levels of elementary school (SD), junior high school (SMP), and senior high school (SMA). In each of these stages the individual experiences development and awareness of the surrounding environment.

According to Law Number 32 the Year 2009 on Environmental Protection and Management, everyone has the right and role in environmental management. The environment is the habitat of all human beings which must be accompanied by an act of awareness in protecting it, while it is also included as one of the facilities and infrastructure for individuals to carry out the learning process in their development.

Educational development and individuals influence each other. This is because the individual is a subject in education, and vice versa, education is a means needed by an individual in the development process (Yetti et al., 2021). Education and learning, when sufficiently set by the needs and considering an individual's potential as well as the environment around it, will be able to achieve the goal (Nurhayati, 2018). Hence, various things that could invoke the potential, which is also associated with the environment, are needed in implementing education.

Human relations, development, environment, and learning; when related to each other in the Indonesian curriculum; they are found in environmental education. Environmental education can be one of the objectives to sensitize individuals on the importance of protecting the environment. Through environmental education, someone will be more aware of the ways to protect the environment, so as one of the factors supporting the learning process, the environment will be more comfortable (Setiawan, Juniarso, et al., 2020).

Apart from environmental education, individual care attitudes as learners can also be built through science learning, for example in school level children. Since the curriculum that integrates the values of environmental education is in a science subject, while the previous curriculum only focused on biology subjects for junior high school and senior high school education, but now it is integrated into science learning.

Science learning, apart from learning the concept of the environment, essentially also studies how an individual applies appropriate behavior in protecting and preserving the environment. In studying science, students are also given the space to think scientifically related to their surrounding environment (Sahronih, Purwanto, & Sumantri, 2020).

Awareness of the attitude of environmental care is needed because it will affect the level of individual concern in observing the surrounding environment (Kasi, Sumarmi, and Astina, 2018). Especially currently with natural conditions that are increasingly experiencing damage due to global warming, causing disasters everywhere. Thus, the role of the individual as a human resource should be able to minimize the occurrence of natural disasters to carry out prevention.

Cultivating moral values from an early age through character-based education will affect the goals of education to build superior human resources in the future, one of which is a form of a preventive act of prevention of nature destruction.

As for the attitude of environment care according to Nenggala (in Nugraheni, 2015) which reflects the character of students in protecting the natural environment, including 1) preserving the environment; 2) not uprooting plants or cutting trees carelessly; 3) not vandalizing on tree trunk around; 4) disposing of garbage in its place; 5) not burning rubbish around the house or housing; 6) participating in cleaning the environment; 7) not hoarding used goods; 8) cleaning up trash that clogs drains.

Applying such an environmentally conscious attitude takes time constantly to have an attitude of environment care ingrained in students, not only in the classroom alone but through internal enforcement by integrating the application of meaningful and character learning.

Nowadays, the application of curriculum in 2013 that integrates the values of character education is capable of being one of the goals for individual moral cultivation as learners, one of which is the application of environmentally conscious attitude in learning science through education and insightful environment. This can be done through learning in the classroom or outside the classroom through a program implemented by the school.

Based on the description of the problem, this research is intended to analyze the effect of environmental education on students' environmental care attitude. This study aims to determine the effect of environmental education on students' environmental care attitude through the analysis of several articles with relevant research topics.

Method

The method used in this research is a meta-analysis study. Meta-analysis is a descriptive study to describe the results of previous similar studies. The meta-analysis research is quantitative. According to Glass (1981), in conducting meta-analysis research, a formula is needed to process a large number of data so that a conclusion can be drawn.

This meta-analysis research uses 10 national and international journals from *Google Scholar*. Some of these research journals became the population in this study.

The procedure in the data collection is done by collecting several journals related to the effect of environmental education on students' environmental care attitude. The criteria for selecting articles in this meta-analysis research are to select journals with the theme of the effect of environmental education, students' environmental care attitude for elementary, junior high and high school levels, which previously consisted of 39 journals and research reports until 10 research journals were selected according to the theme to be analyzed.

The steps of this meta-analysis study by Glass (in Sutrisno, 2007) consist of 1) preparatory step: defining research topics which is the effect of environmental education on students' environmental care attitude. First, the journals consist of 6 national journals and 4 international journals. Second, journals are published in 2015-2020. Third, the journals that are analyzed are research journals that have pretest and posttest results, have t_{counts}, or contain an effect size value; 2) implementation step: collecting the appropriate journals with research topics that have been determined, which is the effect of environmental education on students' environmental care attitude. Some of these journals were coded for analysis and then the effect size (ES) value of each journal is determined; 3) data analysis step: calculating the effect size value of the effect of environmental education on students' environmental care attitude.

To determine the value of the effect size, the equations of effect size is used. This is because there is 1 journal that lists the value of the pretest and posttest, the rest lists the value of t_{count}, and several other journals list the value of the effect size directly.

The equation used in finding the effect size value with the Glass formula is the following (Glass, 1981):

$$Effect\ Size\ (ES) = \frac{\bar{x}\,experiment - \bar{x}\,control}{SD\ control}$$

In journals that do not provide pretest and posttest scores, the following equation is used.

$$Effect\ Size\ (ES) = t_{count}\sqrt{\frac{1}{n_E} + \frac{1}{n_c}}$$

Note: n_E is the number of students in the experimental class, and n_c is the number of students from the control class.

The interpretation of the effect size values is summarized in the following table.

Table 1. Interpretation of Effect Size Test

Effect Size (ES) Value	Category
ES $\leq$ 0,15	Negligible effect
0,15 < ES $\leq$ 0,40	Low
0,40 < ES $\leq$ 0,75	Moderate
0,75 < ES $\leq$ 1,10	High
0,10 < ES $\leq$ 1,45	Very high

Result

This study produces two educational data, which analyze the effect of environmental education on students' environmental care attitude reviewed based on the level of education which consists of elementary school, junior high school, high school; and other categories of environmental care attitude shown by the students.

As for the distribution of the effect size of the effect of environmental education on students' environmental care attitude consists of 6 national journals and 4 international journals coded J1 for the first article, and so on until the J10 for the tenth article. In more detail, the explanation of the source of the article from the J1-J10 is laid in the following table:

Table 2. Article Source Code Category

No	Journal Code	Article Source
1	Journal 1 (J1)	International
2	Journal 2 (J2)	National
3	Journal 3 (J3)	National
4	Journal 4 (J4)	National
5	Journal 5 (J5)	National
6	Journal 6 (J6)	International
7	Journal 7 (J7)	International
8	Journal 8 (J8)	National
9	Journal 9 (J9)	International
10	Journal 10 (J10)	National

The results of the analysis of the 10 journals are stated in the following table.

Table 3. Data Dissemination Distribution of the Effect of Environmental Education on Students' Environmental Care Attitude

Journal Code	Publication Year	Edu. Level	S Value	Category
J1	2019	Elementary School	0.17	L
J2	2019	Elementary School	0.11	N
J3	2016	High School	1.15	H
J4	2019	Junior High School	0.80	M
J5	2020	Elementary School	0.18	L
J6	2017	Elementary School	0.12	L
J7	2017	High School	0.19	L
J8	2019	Elementary School	0.45	M
J9	2019	Junior High School	0.15	L
J10	2018	High School	0.83	M

*Description: **N** (Negligible); **L** (Low); **M** (Moderate); **H** (High); **VH** (Very High)

Based on Table 2, it is stated that 10 analyzed journals have various effect size values. The highest effect size value is in Journal 3 which is 1.15 within the high category, and the lowest effect size value is in Journal 2 is 0.11 within a negligible category.

The subsequent analysis is the effect of environmental education on students' environmental care attitude reviewed based on formal education that consists of elementary school, junior high school, and high school. The following table is the result of the average value of the effect size of the effect of environmental education on students' environmental care attitude reviewed based on the level of education.

Table 4. The Average Value of the *Effect Size* (ES) Data of The Effect of Environmental Education on Students' Environmental Care Attitude Based on Level of Education

No	Education Level	(n)	ES	Category
1	Elementary School	5	0.21	L
2	Junior High School	2	0.48	M
3	High School	3	0.82	H

* Description: **N** (Negligible); **L** (Low); **M** (Moderate); **H** (High); **VH** (Very High)

Based on Table 4, it is stated that the average value of the effect size (ES) at the elementary school level compiled from 5 journals is 0.21 within the low category. Junior high school level compiled from 2 journals, the average effect size is 0.48 within a moderate category; and high school level compiled from 3 journals, the average value of the effect size is 0.82 within the high category.

The next analysis is the effect of environmental education reviewed based on the environmental care attitude shown by the students in the following table.

Table 5. Data of The Average Result of *Effect Size* (ES) of The Effect of Environmental Education Reviewed Based on Environmental Care Attitude Shown by The Students

Environmental Care Attitude	(n)	ES	Category	ES
Maintaining environmental pollution	2	0.48	M	
Preserving nature	4	0.22	L	0,50 (M)
Green School Program	2	0.30	L	
Maintaining ecosystem balance	2	0.99	H	

* Description: **N** (Negligible); **L** (Low); **M** (Moderate); **H** (High); **VH** (Very High)

Based on Table 5 it is stated that the result of the average value of *the effect size* of the effect of environmental education reviewed based on environmental care attitude is the moderate category (M) with the value of 0.50.

The average value of the effect size is obtained from the results of research on environmental care with indicators of environmental care as follows: 1) the indicator of "maintaining environmental pollution" consists of 2 journals having an average effect size of 0.48 within a moderate category; 2) the indicator of environmental care attitude "preserving nature" consists of 4 journals having an average effect size of 0.22 within a low category; 3) the indicator of environmental care attitude "green school program" consists of 2 journals having an average effect size of 0.30 within the low category, and 4) the indicator of environmental care attitude "protecting the ecosystem" consists of 2 journals having an average effect size of 0.99 within the high category.

Based on the 10 analyzed journals, the effect of environmental education on students' environmental care attitude is showed in the following figure in the form of graphs.
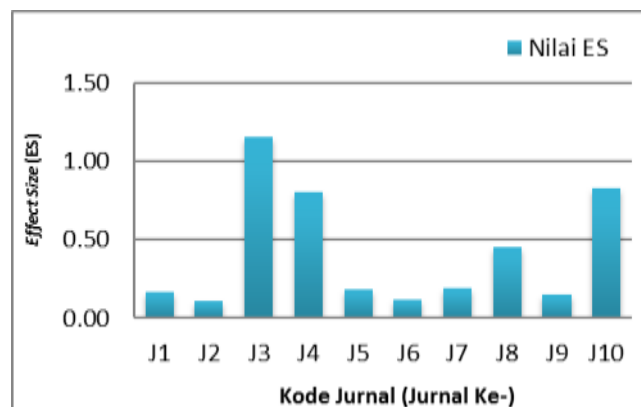

Figure 1. The Effect Size of the Effect of Environmental Education on Students' Environmental Care Attitude

Based on the said figure, it can be explained that the *effect size of* the effect of environmental education has varying results. The highest *effect size* value is the third journal (J3), and the lowest *effect*

size value is the second journal (J2). All the values *of effect size* show positive results; thus, it can be said that environmental education gives impact and can improve students' environmental care attitude.

Discussion

This study aims to see the results of research related to the effect of environmental education on students' environmental care attitude to discuss two categories: 1) education level (elementary school, junior high school, and high school); 2) indicators of environmental care attitudes shown by students, namely maintaining environmental pollution, preserving nature, green school programs, and maintaining balance in the ecosystem.

Broadly speaking, the environmental care attitude shown by students can be improved through a continuous process and does not happen directly. Based on the formal education level in schools, the application the environmental education is more effective at the high school level compared to elementary school and junior high school. It can be drawn from the results of the *effect size* where the high school level has the highest value. One of the factors that influence this is age and development. Students at the high school level are at the age of 15 to 18 years, at that age the child can think abstractly and develop thought patterns with better logic. According to Piaget, at this stage, the development of students is in the formal operational phase (Papalia, 2008).

Students at this stage can integrate what they have learned and develop it in the future. It is shown in how students at the high school level are better in organizing information that has been previously received in the elementary school and junior high school levels. For instance, high school students can already distinguish the negative impacts from not taking care of the environment properly, which will have a negative impact in the future, cause natural imbalances, damage the landscape, and cause disasters. Meanwhile, for students at the elementary school and early junior high school levels, it is necessary to give comprehension and information repeatedly by providing effective teaching techniques because teaching is complex and students at the primary education level (elementary school and junior high school) are more varied and are not specified into specialized majors yet (Santrock, 2008).

Reviewing the indicators of environmental care attitude, the effect of environmental education gives a moderate effect on maintaining environmental pollution indicator, the low effect on preserving natural indicator, the low effect on green school program indicator, and high effect on maintaining ecosystem balance indicator. Preserving nature and green school program indicators provides low effect because of habits in school, so there are equally students who are aware of environmental care attitude but also some who neglect. Also, the environmental care attitude of students can still be improved. Maintaining environmental pollution indicator has a moderate effect because it is familiar to the daily lives of students and this can grow along with awareness in activities. Maintaining ecosystem balance provides a high effect is also because it is contained in the curriculum and integrated into learning so the motivation of students to cultivate an attitude in balancing the ecosystem is high.

Conclusion

Based on the study result and discussion on this meta-analysis, it can be concluded that: 1) the effect of environmental education on students' environmental care attitude at every level of education have varying results, the high school level result is higher than the elementary school and junior high school levels; 2) the effect of environmental education gives moderate effect reviewed based on students' environmental care attitude; 3) the application of environmental education is more effectively applied to high school education level. The implication in this study is it can be utilized as a reference to improve students' environmental care attitude in the implementation of environmental education. Future research

is expected to develop similar variables and build scientific knowledge from various relevant sources with the intent that better conclusions can be drawn.

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