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The Effectiveness of Ecological Intelligence-Based Indonesian Language Textbooks on the Environmentally Friendly Behaviors of State Junior High School Students in Surakarta

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Abstract

This research aims to investigate the effectiveness of ecological intelligence-based Indonesian language textbooks on state junior high school students' environmentally friendly behaviors. This study applies an experimental method. The research population is the 7th-grade students of state junior high schools in Surakarta. Samples were taken using cluster random sampling. Data were collected using the observation technique. The observation technique and instruments were used to gather data regarding students' environmentally friendly behaviors. Validation of the research instruments was carried out using construct validity. Data were analyzed using a t-test with a significance level of 5%. Based on the results of data analysis, this research concludes that ecological intelligence-based Indonesian language textbooks significantly influence students' environmentally friendly behaviors.

Keywords: ecological intelligence, environmentally friendly behaviors, Indonesian language

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1. Introduction

We are now faced with serious environmental problems, including global warming, ozone depletion [1], and species extinction, all of which threaten the sustainability of life [2]. Phenomena of environmental changes are problems that have to be taken into account [3]. Flood and erosion resulting from forest cutting, the energy crisis, land pollution, increased population, unemployment, poor educational status, poor

water and air hygiene, and the decrease of quality of life, as well as global warming phenomena, have effects in terms of climate anomalies and extreme heat of the Earth.

Many humans' behaviors endanger and have alarming effects on environmental sustainability. Humans make an effort in their life to change the environment based on their needs [4]. This can potentially disturb or damage ecosystem components and balance. In Indonesia, human behavior is the biggest single factor contributing to disasters as recorded in the results of research on the causes of floods [5, 6].

The seriousness of the global environmental crisis highlights the urgent need for an agenda that focuses more on environmentally friendly behaviors. The challenge of developing a sustainable environment lies in changing human behavior [7]. Hence, efforts should be made to change people's behaviors, particularly students' behaviors, in order to show more concern for the environment.

In the last few years, researchers on the relationship between education and concern for the environment have been carried out by a number of experts. In their research on scientific literacy schools, In order to achieve sustainable scientific literacy development, it is important for teachers to develop a positive attitude toward knowledge [8]. On social science textbooks research for elementary schools in Turkey, concluded that components of environmental knowledge are more widely available than other environmental literacy components [9].

The aforementioned researchers have shown the importance of education and textbooks in the effort to develop pro-environmental behaviors. The present study aims to examine the effects of ecological intelligence-based Indonesian language textbooks on students' environmentally friendly behaviors.

2. Methods

This research applies a quasi-experimental method with the main objective of examining the effect of treatment on the research results controlled by other contributing variables [10]. The research population is the students in the 7th grade of state junior high schools in Surakarta. Experiments were carried out in two groups: an experimental group consisting of 30 students from State Junior High School 3 of Surakarta and a control group consisting of 30 students from State Junior High School 4 of Surakarta. Samples were taken using cluster random sampling. The experimental group used an ecological intelligence-based Indonesian language textbook, while the control group used an Indonesian language textbook published by the Ministry of Education and Culture.

Variables of this research include one independent variable (ecological intelligence-based Indonesian language textbook) and dependent variables (environmentally friendly behaviors). The ecological intelligence-based Indonesian language textbook is an Indonesian language textbook that is arranged by considering the development of language skills and literature appreciation and the integration of ecological intelligence values. The integration of ecological intelligence values in the Indonesian language textbook is presented in passages, exercises and assignments, questions, and in other parts, such as titles, the preface, and directions. Moreover, some cases related to various ecological intelligence values are mentioned in the textbook.

Environmentally friendly behaviors are the actual steps taken by individuals to maintain and preserve the environment. Students' environmentally friendly behaviors examined in this study focus on pro-environmental behaviors at school, which cover 12 observed indicators, namely: (1) response to friends' environmentally friendly behaviors; (2) response to friends'/teachers' warning about the lack of environmentally friendly behaviors; (3) action in regard to managing garbage in the class; (4) action in regard to managing garbage in the school yard; (5) action in regard to coping with a dirty class/school; (6) action in dealing with unnecessary water fountain use; (7) action in dealing with unnecessary lamp use; (8) action in regard to throwing away food wrappings/leftovers; (9) action in regard to scribbling on tables; (10) action in regard to scribbling on walls; (11) action in regard to unnecessarily picking flowers; and (12) action in regard to preserving plants at school.

Data were collected through observation. A two-month observation was conducted by teachers by using an observational instrument. The instrument was validated using construct validity, an instrument developed by referring to the concept of environmentally friendly behaviors. The aforementioned 12 indicators were assessed using scores ranging from 0 to 100. Therefore, the maximum score that could be gained is 1200. The score gained was then converted into a value ranging from 0 to 100.

The data analysis technique used to test the effectiveness of the model of ecological intelligence-based textbooks was a t-test (independent t-test) with a significance level of 5%. Prior to hypothesis testing, prerequisite tests comprising the Lilliefors test for normality, the Bartlett test for variance homogeneity, and a balance test were performed.

3. Results

Prior to the t-test, as previously explained, a prerequisite normality test, a test for variance homogeneity, and a balance test were carried out. The test for normality was conducted to find out whether or not data regarding environmentally friendly behavior were obtained from a normally distributed population. The Kolmogorov-Smirnov test for normality resulted in a value of 0.637 and an asymptotic significance value of above 0.05 (0.812). Therefore, H_0 is accepted and data are considered normally distributed.

The test for homogeneity was estimated to find out whether or not two or more groups of sample data were obtained from a population with similar variance. The criterion is that if the p-value is more than 0.05, the variance of two or more groups of data is regarded as similar. The computation results in a p-value of 0.085 > 0.05, and therefore the data were taken are sourced from homogeneous samples.

The balance test was performed to examine the balance between the experimental and control groups' mean scores for environmentally friendly behaviors prior to treatment. An independent t-test was employed. The criteria for decision-making with regard to the value of α of 0.05 include 1) a significance probability (p) of ≤ 0.05, which indicates balance; and 2) a significance probability (p) of > 0.05, which shows balance. The results of the balance test of pretest data of the experimental and treatment groups' environmentally friendly behaviors are presented in Table 1.

Table 1: Balance Test of Pretest Data of Environmentally Friendly Behaviors.

	Mean	S^2	d_b	t	t_{table}	Sig.
Experimental Group	75.10					
		35.049	58	0.83	2.00	0.05
Control Group	73.83					

Table 1 indicates that the p-value of t is 0.83, while that of t_{table} is 2.0. Since p = 0.83 < 0.05, data of the experimental and treatment groups' environmentally friendly behaviors prior to treatment were balanced.

After the prerequisites had been met, a test for model effectiveness by comparing the experimental and control groups' posttest results on environmentally friendly behaviors was carried out. An independent t-test was applied. Table 2 details the results of the t-test, indicating the difference between the experimental and control groups' posttest mean scores.

Table 2: Balance Test of Posttest Data of Environmentally Friendly Behaviors.

	Mean	S^2	d_b	t	t_{table}	Sig.
Experimental Group	86.5					
		41.038	58	7.5	2.00	0.05
Control Group	74.9					

Table 2 reveals a p-value of t of 7.5 and that of t_{table} of 2.0. Since $t > t_{table}$ (7.5 > 2.0), H_o is rejected, meaning that there is a significant difference between the experimental and control groups' posttest results for environmentally friendly behaviors. The difference in the environmentally friendly behaviors between the control and experimental group can be seen in Figure 1.

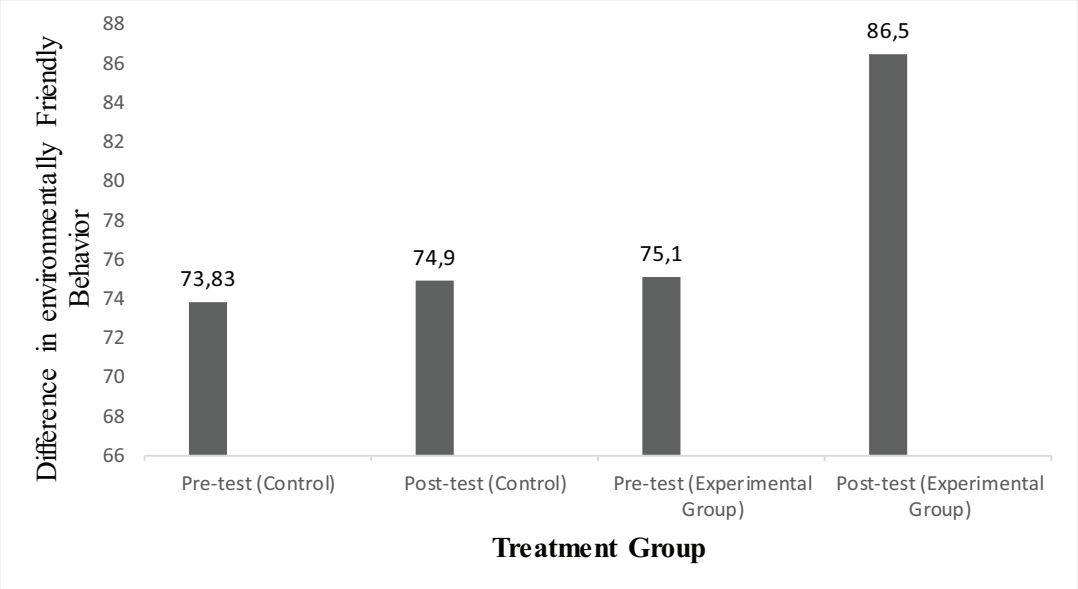

Figure 1: Difference in Environmentally Friendly Behaviors.

It is clear that the pretest score for students' environmentally friendly behaviors in the control group is 73.83 and the posttest score is 74.9, which means that there is only an increase of 1.07. Meanwhile, in the experimental group, the pretest and posttest scores are 75.1 and 86.6, respectively, meaning that there is an increase of 11.4.

The conclusion regarding the influence of ecological intelligence-based textbooks on environmentally friendly behaviors is in line with Jung's opinion [11]. With high awareness of the importance of the living environment, humans are able to control the surrounding natural environment or so-called ecological intelligence. Ecological intelligence involves understanding and interpretation of the human relationship with

all elements and other living creatures, reflected in the forms of deep empathy and awareness of the environment.

Awareness is the actual embodiment of empathy. Empathy encourages individuals to build relationships with others. It develops when they start to be curious about other people and their experiences. Such empathy is then reflected in the form of behavior. The best way to understand the forms of awareness is to see whether awareness is practiced [12].

Students' environmentally friendly behaviors are associated with understanding ecological intelligence values. Ecological intelligence refers to the understanding of hidden ecological impacts and problem solving to cope with them [13]. Ecological intelligence combines cognitive skills and empathy in all forms of life. Both social and emotional intelligence are constructed by abilities to perceive others' views, feel what others feel, and show awareness, while ecological intelligence expands such capacities to all natural systems. We may show our empathy and feel miserable if seeing the Earth suffer, or be committed to making things better.

4. Conclusion

This research concludes that ecological intelligence-based Indonesian language textbooks exert an influence on environmentally friendly behaviors. Students who learn by using those books exhibit better environmentally friendly behavior than those who learn by using textbooks compiled by the Ministry of Education and Culture.

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