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Fostering Environmental Citizenship through Waste Management Education: The Role of the 3R Program

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ABSTRAK

Environmental problems, particularly the increasing volume of waste, have become a significant challenge for sustainable development. In Bandar Lampung, waste production reached approximately 890 tons per day in 2025, highlighting the need for effective environmental education initiatives. One approach to fostering environmental responsibility among students is the implementation of the 3R (Reduce, Reuse, Recycle) program, which encourages waste reduction, material reuse, and recycling practices. This study aimed to examine the effectiveness of the 3R program in strengthening environmental citizenship among students at MIS Al-Hikmah Bandar Lampung. This study employed a quantitative descriptive approach. The population consisted of all students at MIS Al-Hikmah Bandar Lampung, while the sample was determined using simple random sampling based on the Slovin formula with a 10% margin of error. Data were collected through observation, interviews, and questionnaires. Data analysis was conducted using descriptive statistics, a t-test, and the Likert Summated Rating (LSR) method to determine the effectiveness level of the program. The results showed that the 3R program had a significant effect on students' environmental citizenship. The t-test analysis yielded a t-value of 5.024 with a significance level of 0.000 ($p < 0.05$), indicating that the null hypothesis was rejected and the alternative hypothesis was accepted. Furthermore, the effectiveness analysis revealed an average score of 76.01%, placing the program in the "fairly effective" category. These findings suggest that the 3R program contributes positively to developing students' environmental responsibility, awareness, and participation in environmental preservation activities. This study concludes that the 3R (Reduce, Reuse, Recycle) program is an effective strategy for strengthening environmental citizenship among elementary school students and can serve as a practical approach to integrating environmental values into citizenship education.

INTRODUCTION

The environment constitutes an inseparable component of human life and serves as the primary system supporting the sustainability of all living organisms. It encompasses both biotic elements, including humans, animals, and plants, and abiotic elements such as water, air, soil, and climate. The interaction between these components forms a dynamic ecosystem that directly influences the quality of life and the continuity of development. Consequently, environmental preservation is not merely a moral obligation but also a necessity to ensure ecological balance and the sustainability of future generations. Environmental care can be understood as a series of attitudes and actions aimed at preventing environmental degradation and restoring damaged environmental conditions (BPHN, 1997). Therefore, every individual is expected to demonstrate environmental responsibility through behaviors that support environmental sustainability (Ismail, 2021).

The importance of environmental preservation has also been emphasized in Law Number 23 of 1997 concerning Environmental Management, which defines the environment as a spatial unit consisting of objects, energy, conditions, and living organisms, including humans and their behavior, that influence the continuity of life and welfare (BPHN, 1997). This definition highlights that environmental issues are not solely related to natural resources but are also closely connected to human behavior. In other words, environmental quality is largely determined by the attitudes and actions of individuals and communities in utilizing and managing environmental resources.

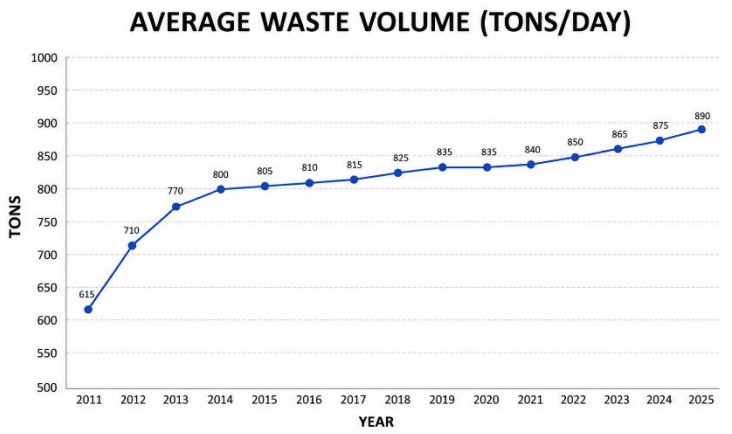
Despite the growing awareness of environmental sustainability, various environmental problems continue to emerge in many sectors of society. One of the most pressing environmental issues is waste management. The increasing volume of waste generated by human activities has become a major challenge, particularly in urban areas experiencing rapid population growth and consumption patterns. Waste is defined as residual material resulting from human activities that is no longer used, desired, or considered valuable (Putrawan, 2022). According to the World Health Organization (WHO), waste can be classified based on its source into natural waste, human waste, consumer waste, nuclear waste, industrial waste, and mining waste. Furthermore, waste can be categorized based on its characteristics into organic and inorganic waste, and based on its physical form into solid, liquid, and gaseous waste (Putrawan, 2022).

The complexity of waste management problems is not only caused by the increasing volume of waste but also by the low level of public awareness regarding environmentally responsible behavior. In Indonesia, waste management continues to face various challenges, including inadequate waste-sorting practices, limited infrastructure, insufficient waste processing facilities, and a shortage of professional human resources in the environmental sector. As a result, waste management systems often fail to operate effectively and sustainably (Wati et al., 2021). These conditions contribute to environmental pollution, ecosystem degradation, and public health risks.

Environmental issues are also evident within educational settings. Schools, which are expected to function as institutions for character development and environmental education, frequently encounter problems related to waste management and environmental cleanliness. Many students continue to dispose of waste improperly, leave rubbish inside classrooms or desk drawers, and demonstrate behaviors that reflect low environmental awareness. Such practices indicate that environmental values have not been fully internalized in students' daily behavior. Considering that schools play a strategic role in shaping future generations, environmental education should not only focus on cognitive understanding but also foster environmental responsibility and sustainable habits among students (Maulana et al., 2021; Ismail, 2021).

The urgency of addressing waste management problems is further reflected in environmental incidents occurring in Bandar Lampung. The Lampung Forum for the Environment (WALHI) stated that a recent waste-related fire incident should not be viewed merely as an isolated event. According to WALHI Lampung Director Irfan Tri Musri, the incident represents a broader systemic failure in waste management and environmental governance in Bandar Lampung City. This statement underscores the need for comprehensive efforts involving government institutions, communities, and educational organizations to improve environmental awareness and waste management practices. Furthermore, the continuous increase in waste production over time indicates that environmental problems will become

increasingly severe if preventive and educational measures are not implemented effectively. The trend of increasing waste generation can be observed in the following graph.



Waste production in Bandar Lampung continues to increase and reached approximately 850 tons per day in 2023 (Wati et al., 2021). Although waste management efforts have shown improvement through various government programs, waste remains a serious environmental challenge. The Bandar Lampung Environmental Agency has implemented campaigns, socialization programs, and environmental education initiatives in schools to encourage waste reduction and increase public awareness regarding environmental sustainability (Ismail, 2021; Zaenuri & Muqowim, 2021). However, environmental problems persist due to low levels of environmental awareness and responsible waste management behavior among community members, including students.

Environmental awareness is closely related to environmental knowledge and attitudes. Individuals with adequate environmental knowledge tend to demonstrate greater responsibility in preserving nature and preventing environmental damage (Maulana et al., 2021). Nevertheless, environmental problems within schools remain common, including littering, low participation in environmental activities, and limited concern for environmental cleanliness. Such conditions indicate that environmental awareness among students still requires continuous strengthening through educational interventions (Afriyadi et al., 2022).

One approach that can be implemented to foster environmental awareness is the 3R program (Reduce, Reuse, Recycle). The 3R concept encourages individuals to reduce waste generation, reuse materials that are still functional, and recycle waste into useful products (Yasir, 2024; Yusmaniarti et al., 2024). Beyond reducing waste volume, the 3R program also serves as an educational strategy for developing environmentally responsible behavior among students (Murtini, 2024).

Preliminary observations conducted at MIS Al-Hikmah Bandar Lampung revealed that environmental awareness among students remains relatively low. Interviews with school staff indicated that some students still dispose of waste improperly despite the availability of waste bins. Furthermore, although the school has collaborated with a waste bank in sorting organic and inorganic waste, the implementation has not been optimal, and the 3R program has not yet been systematically applied. Therefore, it is necessary to examine the effectiveness of the 3R program in improving students' environmental awareness. Based on these conditions, this study aims to analyze the effectiveness of the 3R Program (Reduce, Reuse, Recycle) in improving students' environmental awareness attitudes at MIS Al-Hikmah Bandar Lampung.

METHOD

The research method is an important component in research to obtain data or information for the completeness of research data, because the research method can direct researchers to determine the tools or processes that will be used in the data collection process. The research method is a scientific way to obtain data with certain goals and uses (Sujarweni, 2024). This research is a type of descriptive

quantitative research. The reason the author uses this descriptive research method is that the author wants to find out whether there is an effectiveness of the 3R program (Reuse, Reduce, Recycle) on the environmental care attitudes of students. This descriptive analysis is carried out to describe and measure the characteristics of a social phenomenon. This research was conducted at MIS Al-Hikmah Bandar Lampung, Kedaton, Bandar Lampung City.

Research instruments are tools or facilities used by researchers to collect data to make their work easier and produce better results, in the sense of being more precise, complete, and systematic, making them easier to process.13 In measuring respondents' opinions, a Likert scale can be used. With a Likert scale, the variables to be measured are broken down into variable indicators, which are then used as a starting point for compiling instrument items in the form of statements or questions. Each existing indicator has its own sub-indicators, which are then developed in such a way that they form questions and are provided.

4 answer choices. The alternative answers provided by the researcher are SS (Strongly Agree), Agree (S), Disagree (TS), and Strongly Disagree (STS). The data analysis technique used was a normality test and hypothesis test using SPSS version 25 and also conducted an effectiveness test with the LSR method. The population in this study were all 374 students. In this study, sampling was carried out using a random sampling technique. It is said to be simple because sampling from the population was carried out randomly without paying attention to the strata in the population. In this study, to determine the sample size from the population, it was calculated based on the Slovin formula with an error level or tolerable error rate of 10% or 0.1. Because in this study the population was more than 100, the researcher used the formula:

$$n = \frac{N}{1+N_{(\square\square)^2}}$$

Keterangan:
n = total Sample
N= total popul;ation
e = Eror level (use 10 %)

$$n = \frac{374}{1+374\ .(0,1)^2} = 78,9 = 79$$

Number of Research Sample Members

No	Class	Population	Calculation	Sample
1	Class I	66	66 x 79 : 374 = 14	14
2	Class II	62	62 x 79 : 374 = 13	13
3	Class III	66	66 x 79 : 374 = 14	14
4	Class IV	59	59 x 79 : 374 = 12	12
5	Class V	72	72 x 79 : 374 = 15	15
6	Class VI	49	49 x 79 : 374 = 10	10
Total				79

In quantitative research, validity and reliability tests are known. Validity is a term used to describe the accuracy of a measuring instrument, namely the accuracy of measurement of what should be measured. Based on the results of calculations using Microsoft Excel, it is known that 19 out of 25 statements are valid. Meanwhile, the reliability test is carried out to determine the level of reliability of an instrument so that an instrument can be accounted for. Reliability is the consistency or stability of an instrument's score against the same individual, and given at different times. Related to this, to find the level of reliability of the instrument, the researcher used SPSS version 25. An instrument is said to be reliable if r11 > rtable. The results of the reliability test are presented in the following table:

Reliability Statistics

Cronbach's Alpha	N of Items
.761	19

Sumber: SPSS Windows Versi 25

From the analysis above, it can be seen that the coefficient of the environmental care attitude instrument is 0.761, so the student's environmental care attitude instrument can be said to be reliable because r count (0.761) > r table (0.329).

RESULTS AND DISCUSSION

RESULTS

After conducting validity and reliability tests, the next step is to conduct the analyst prerequisite test. The analyst prerequisite test is carried out in two stages:

Normality Test

The Normality Test aims to determine whether the environmental care attitude data is normally distributed or not. This test was carried out using the One-sample Kolmogorov Smirnov Test with SPSS version 25. shows the results of data analysis with the Kolmogorov Smirnov test obtained the results of K-SZ = .097 with sig. 0.65. If p <0.05 then it can be said that the data is not normal, and if p> 0.05 then it can be said that the data is normally distributed. then it can be concluded that 0.065> 0.05 then it can be said that the data is normally distributed.

Hypothesis Testing

Hypothesis testing is conducted to determine whether the independent variable influences the dependent variable. If H0; μ≤ 59.9%, it is declared ineffective if it receives a rating of less than 60 percent. If HI; μ≥ 60%, it is declared effective if it receives a rating of more than 60%.

Effectiveness Measurement

To determine the percentage of effectiveness of the 3R program (Reuse, Reduce, Recycle) on students' environmental awareness, the researcher conducted a test using the Likert Summarizing Rating (LSR) method.

According to Yulistiana in Safitri Wilia, the mathematical formula for effectiveness is:

$$\underline{\text{Efektivitas}} = \frac{\text{◎◎o r ◎ i◎◎}}{\text{Skor Harapan}} \text{ X } 100\%$$

Dimana:
Skor Harapan = ∑ Responden X high score X Item
= 79 X 4 X 19
= 6.004

Skor Rill = ∑ Frekuensi Jawaban Responden X Skor Nilai Jawaban
= 4.564 (Terlampir di Excel)

$$\text{Efektivitas} = \frac{4.564}{6.004} \times 100\%$$

$$=76{,}01\%$$

The scores obtained will be converted using the effectiveness measurement standards according to the Ministry of Home Affairs Research and Development to see the level of effectiveness achieved, as follows:

Table 1 Standard Measures of Effectiveness

Ratio Efektiv	Achievement Level
Below 40%	Very not Effective
40% - 59,9 %	Not Effective
60% - 79,9 %	Quite Effective
Above 79,99 %	Very Effective

From the table above, it shows that the environmental care attitude of students at MIS Al-Hikmah Bandar Lampung through the 3R program is quite effective with a ratio of 76.01% obtained from the average value of the results of the questionnaire distribution. With the conclusion that the 3R program (Reuse, Reduce, Recycle) is quite effective towards the environmental care attitude of students at MIS Al-Hikmah Bandar Lampung.

DISCUSSION

1. Program 3R (Reduce, Reuse, Recycle)

There are two terms for "program," namely the specific and general meanings. Generally, a program can be defined as a plan. Specifically, a program is a plan or draft of activities to be carried out. According to the Big Indonesian Dictionary, a program is defined as a plan regarding principles and efforts (in state administration, economics, and so on) that will be implemented. According to Saifudin Anshari, a program is a detailed list of events and efforts to be implemented (Diana & Ratna Sari, 2023). Wholey states that a program can be defined as a carefully planned activity. Meanwhile, Suarsimi Arikunto defines a program as a carefully planned activity (Diana & Sari, 2023).

It can be concluded that a program is a series of activities that have been planned before being implemented. According to Sugiyono in the journal of public relations, program effectiveness can be measured by four dimensions, namely: the accuracy of program targets, program socialization, program objectives, and program monitoring. According to H. Emerson's opinion, quoted by Handayaningrat, who stated that: Effectiveness is a measurement in terms of achieving predetermined goals. According to Peter Drucker, Stoner and Wankel in Wilhelmus W. Bakowatun said that effectiveness means doing the job correctly (Martauli et al., 2022). Effectiveness is the ability to choose the right target.19 It can be concluded that Effectiveness is a fundamental element in achieving a predetermined goal and target in a program. If the predetermined goal or target is achieved, it can be said to be effective.

According to Yusmaniarti et al., the 3R (Reduce, Reuse, Recycle) program is a waste management strategy aimed at reducing the quantity and improving the characteristics of waste for further processing (Yusmaniarti et al., 2024). According to Sartono, this program focuses on reducing

the amount of waste generated, reusing materials that can still be used, and reprocessing unusable materials into reusable materials. It can be concluded that implementing the 3R (Reduce, Reuse, Recycle) program related to waste management can reduce the amount of waste generated (Ismail, 2021).

One of the waste management programs is through the 3R program (Reduce, Reuse, Recycle) which is a new concept in waste management that can prevent waste generation, reduce the amount of waste, minimize waste use by encouraging the use of items that can still be used, and implement environmentally friendly waste disposal. The implementation of the 3R program (Reduce, Reuse, Recycle) starts from elementary school level to college to form a mindset and attitude of caring for the environment, being creative and responsible in order to create a healthy and clean environment. The 3R program consists of:

a. Reduce

Reduce means reducing, as much as possible, the number of items or materials used. This can be achieved by minimizing the use of waste-producing items, such as single-use items, to minimize waste generation. For example, when shopping, use your own shopping bag to eliminate the need for plastic bags.

b. Reuse

Reuse is extending the useful life of an item through direct care and reuse. Waste is recycled for reuse. Reuse involves reusing used items without processing them first, such as reusing packaging or reusing packaging for storage. This can extend the life of the packaging and the amount of time an item can be used before it needs to be thrown away.

c. Recycle

Recycling is an effort to reduce waste by reprocessing used goods or materials into new, reusable products. In this case, a distinction must be made between organic and inorganic waste. 22 To recycle inorganic waste, you can collect items such as used plastic beverage bottles, magazines, used paper, and used cans.

The 3R (Reduce, Reuse, Recycle) program is a waste management strategy aimed at reducing the quantity and improving the characteristics of waste for further processing. This program focuses on reducing the amount of waste generated, reusing materials that can still be used, and reprocessing materials that cannot be reused into reusable materials. Thus, the 3R (Reduce, Reuse, Recycle) program can reduce the volume of waste entering the Final Processing Site (TPA) and increase waste management efficiency. Waste processing is an effort to reduce the volume of waste or change its form to become more useful (Yasir, 2024).

2. Environmentally Concerned Attitude

Environmental awareness is a feeling of wanting to improve and manage the environment properly and beneficially, allowing for continued enjoyment without damaging its condition, and contributing to its preservation and sustainability, resulting in sustainable benefits. Hamzah explains that environmental awareness is a manifestation of an individual's mental attitude reflected in their behavior (Ismail, 2021). According to the Ministry of National Education, environmental awareness is an attitude and action that consistently strives to prevent damage to the surrounding natural environment and develops efforts to repair existing damage.

Environmental care is an attitude and action to prevent damage to the surrounding natural environment and strive to repair existing damage. A person's indifference to the environment can cause problems that often occur in the preservation of green land that is often used for building settlements, causing flooding due to the lack of water absorption when it rains. Suparno explained that environmental care is demonstrated by respect for nature. The essence of respect for nature is the awareness that humans are part of nature, so loving nature also loves human life. Loving the environment and nature, everyone will care about maintaining the sustainability of the environment, not destroying and exploiting it so that in the future, an environment that benefits all humans who are part of that environment is created. As students, we are also obliged to care for the surrounding environment. The environmental care movement is included in the nationalist character values. Nationalist values are how we behave, think, and act that demonstrate a spirit of loyalty, respect, and concern for the environment, economy, socio-culture, politics, and nation above personal or group interests. The values contained in the nationalist character include protecting the environment, preserving natural resources, love of the homeland, and discipline (Angriani et al., 2021).

CONCLUSION

Based on the results of the research from the data processing that has been done by the researcher, it can be concluded that the environmental care attitude of students at MIS Al-Hikmah Bandar Lampung school through the 3R program (Reduce, Reuse, Recycle) in the 2024/2025 academic year from the calculation results using the T test, the t count was obtained at 5.024 and a significance of 0.000 which means <0.05. It can be concluded that the 3R program (Reduce, Reuse, Recycle) has an effect on students' environmental care attitudes, because t count> t table (5.024)> (1.99), then Ho is rejected and Ha is accepted. The 3R program (Reduce, Reuse, Recycle) at MIS AL-Hikmah Bandar Lampung school is included in the fairly effective category with an average value of 76.01% where 60% - 79.9% is included in the fairly effective category in increasing students' environmental care attitudes at MIS Al-Hikmah Bandar Lampung school.

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