

THE IMPACT OF USING ECOBRICKS IN 3R (REDUCE, REUSE, RECYCLE) PROGRAMS ON WASTE MANAGEMENT KNOWLEDGE OF ELEMENTARY STUDENTS

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ABSTRACT

The purpose of this study is to examine how the use of ecobricks in 3R programs (reduce, reuse, recycle) affects knowledge about waste management. The analysis methodology used is a quantitative analysis with a quasi-experimental method using a 20-question pre-test and post-test multiple-choice question composition. The coefficient of determination was calculated to be 10.5% for the control group and 20.8% for the test group. The R-squared (%) increased compared to the untreated control class. The use of ecobricks in the 3R program (reduce, reuse, recycle) has proven to be superior to the management class in terms of waste management knowledge.

Keywords: *Knowledge of eco-bricks, 3Rs (reduce, reuse, recycle), waste management, ecobricks*

INTRODUCTION

This research is motivated by the existence of waste problems that cause environmental pollution and where existing waste management has not yet been optimized. In schools, a significant portion of food waste (19.44%), plastic waste (14.58-17.93%), solid plastic waste (3.35%), and other waste (up to 16.21%) consist of inorganic waste. It has a food loss from classes and offices show that everyone, especially students, always bring food to class and office. Most of the waste comes from plastic foil for food and mineral water bottles (Arazo in Sari, 2017). Adopting a 3R program is good waste management to reduce the burden on landfills. Applying the 3R principle to waste management can reduce waste by up to 68.3%. (Trihadiningrum in Widiyaningrum and Purwantoyo, 2015).

When it comes to be implemented through education, cultivating understanding and awareness of the need of sustaining environmental quality is extremely excellent. The most fundamental training is in primary education (Uno dan Mohamad in Trahati, 2015). Children are very enthusiastic about learning about the world around them, and there is a significant need for support and understanding when it comes to taking action to protect the environment, according to Sadulloh in Trahati (2015). The level of participation in trash management to protect the environment will depend on the students' comprehension of waste management, claims Riswan in Widiyaningrum & Purwantoyo (2015).

Found behind the detailed background existing issues are: There is a waste problem that causes environmental pollution, affect the environment, health and beauty surroundings: Waste management is still trivial; awareness of student environment, especially management waste still needs improvement; not many students know that EcoBricks can be used as a convenience item. Based on the problem posed, the problem formulation of this research can be formulated as follows: Will Ecobrick affect 5th grade knowledge waste management?. The purpose of this study was to determine the impact and magnitude of impact of the use of Ecobricks on waste management knowledge in elementary school students. The purpose of this ecobrick project is to teach students how to use plastic garbage and plastic bottles to create an ecobrick-friendly environment and to

empower kids by converting waste into very profitable energy-efficient products. The school that supports students in using the EcoBrick program to cultivate a caring attitude toward the environment cannot be separated from student activities about plastic trash produced.

The research method used in this study is a quasi-experimental approach with pretest-posttest design (Quasi Experiment Research). This study was carried out at Ciater, Serpong, RT 04 RW 09, South Tangerang. Students at elementary schools in the fifth grade represent the study's population. In this research, random sampling was used in the sampling method. The sample consists of 20 kids; 10 of them participated in an experiment utilizing ecobricks, and 10 of them were in the control group. In this study, documentation, tests, and observation were used as data gathering methods.

THEORYTICAL REVIEW

1. Waste

Garbage is the byproduct of daily human activity that is no longer desired, needed, or even thrown away. This waste, however, does not imply that it is no longer useful because it can still be recycled or used to make other products with uses that are distinct from their original ones. Waste can be produced by domestic tasks, workplace activities, commerce, agriculture, plantations, and even industry. One consequence of a growing population is that waste output is rising daily.

If waste management practices are not correctly implemented, the amount of waste in the environment will undoubtedly increase environmental and health issues. Waste management can be done either alone or in groups, depending on each person's skills. The Republic of Indonesia's Regulation No. 81 of 2012 about the Management of Household Waste and Household-Like Waste specifies in article 1 that waste management is a systematic, all-encompassing, and ongoing activity that encompasses waste handling and reduction. The 3R approach (Reduce, Reuse, and Recycle) can be used to manage garbage on a household scale. The 3R principle can be used to manage garbage in a way that not only cuts down on waste production but also has economic benefits for the community by providing an additional source of income (Widiyawati in Paundan, 2023)

2. Knowledge of waste management

Waste management means collection, transport, treatment, recycling or disposal waste. Implement waste management to improve natural resources. Waste management can combine materials such as solids, liquids, and gases, and each type of material is managed differently. (Widiyanto, 2017). Waste management includes waste reduction and disposal activities. Reduction waste includes containment, reuse and recycling activities and waste disposal activities include sorting, collection, transport, treatment and finishing (RI Act No. 18, Waste Management Section 20). Waste management activities are defined as efforts to reduce and recycle waste. It treats (reuses) existing waste and converts recycled waste into an energy carrier. (Gusti, A., 2015).

The participation of the school community, especially students, is noticeable in the context of waste management based on, among other things, participation when sorting between waste organic and inorganic waste in the process container/shelter, participation in processing, as well as desire reduce the use of unwanted goods easy to decompose, Yolarita in Widiyaningrum (2015). Integration of waste management is the choice and use of management programs, technologies, and procedures that are suited for achieving general and targeted waste management goals, such as waste management school. According to Yasa (2012), in order to

manage garbage in an environmentally responsible way, you must first modify how you view and handle waste. Waste should be seen as an affordable resource that may be put to good use, like composting.

Building a practice of sorting waste is a good place to start if you want to shift people's perspectives, yet it can be challenging to ask them to do so because it goes against their beliefs, culture, and way of life and isn't well understood by many people in the neighborhood.

According to Ulfa (2016), Waste management in schools can implement by:

1. Segregation divides waste into organic waste and inorganic waste.
2. Waste disposal based on 3R concept.
 - a. Reuse
 - b. Reduce (reduce waste)
 - c. Recycle
3. Garbage that cannot be disposed of will be collected at TPS and brought to TPA by cleaning staff.
3. Concept of reduce, reuse and recycle.

The concept of "reduce, reuse and recycle" is synonymous with using waste and scrap for materials that help reduce pollution. There is a lot of waste in our environment, including plastic waste, beverage bottle waste, rags, glass bottles, food packaging, and other household items that can be used to create quality products. The 3Rs, Reduce, Reuse and Recycle, are the best ways to manage and address various waste issues.

Reduce means to reduce anything that can be wasted. Examples of reductions include using refillable products such as refillable stationery, buying unnecessary items to save money, and reducing the use of disposable materials. On the other hand, reuse means that the product can be reused in its original shape. Other features. Examples of reuse or reuse are: Write on the blank side of the paper and reuse the container that still works. For example, we are reusing used bottles as containers for cooking oil, and reusing the plastic and paper we collect from our results. Collect and reuse as needed, not just when shopping.

To recycle is to change the shape and use it again. Examples Recycling means processing organic waste for composting, fabricating patchwork, or manufacturing products from plastic waste. Examples of patchwork products include handkerchief patchwork and rag doll crafts. Examples of products made from plastic waste include lanterns made from used bottles and tote bags made from used coffee boxes and snacks. Can waste is processed into pots and pencil cases. (Maulidin, Ilham, 2017)

4. Ecobricks

Ecobrick comes from the word ecology, which means the science that studies the interaction (ecology) of living things and their environment. Bricks are bricks, i.e. eco-friendly bricks. The idea was put forward by Russell Meyer from Canada and Ani Himawati from Indonesia. They are a couple who have good taste and take great care in dealing with issues related to waste, especially plastic waste (Fahullah in Arianto, 2019). At Ecobrick, plastic waste is packed clean and dry into plastic bottles of a specific density.

One strategy for managing plastic waste is Ecobrick. Reduce plastic waste by mixing it with used plastic bottles that have been compressed with bamboo sticks to get the necessary density. The resulting material may then be utilized to create works of art or used as ecologically friendly stone or brick. Ecobrick products are now being processed into useful items such as chairs and tables (Ashi and Fitriani, 2018).

Ecobricks can draw in new life toward plastic waste. In addition to disposing of waste in landfills (Waste), Eco Bricks is another way to recycle waste. With ecobricks, we have an opportunity to treat our waste and turn plastic waste into something that benefits the environment and the surrounding communities. The properties of plastic are durable and scratch resistant. With Ecobricks, this plastic waste is stored in bottles so it doesn't need to be incinerated, it just accumulates. Ecobrick technology allows industrial recycling systems to produce plastic, thus escaping the biosphere and saving energy. Ecobricks protect plastics from carbon dioxide evaporation and prevent global warming. Eco-bricks are often used in the manufacture of furniture, gardens, green parks and building walls. If that is not possible, there are now many garbage banks willing to exchange eco-stones for money (Imron, 2019).

Making eco-bricks is easy, but there are some important steps. The most important part of the manufacturing process for the first eco-bricks was careful guidance. And In this way, the school will produce a large number of ecobricks and in the coming years thousands of these customs will be launched with the best technology.

1. Put the non-biodegradable into the bottle, plastic, foam, package and cellophane.
2. Do not insert sharp objects or similar substances, paper.
3. Use a bamboo or wooden stick to fill the bottle with plastic until it is full.
4. Use soft plastic for the bottom bottle.
5. Use colored plastic to color the bottom of the bottle.
6. For ease of preparation, use the same brand of bottle for the agar.
7. You can also use small bottles. Look for smaller bottles that are easy to find in your neighborhood. (Meyer & Angway, 2017)

Tools and materials for easy and cheap production of ecobricks.

1. Plastic waste
2. Used plastic
3. Scissors
4. Bamboo/wood (thin end)

Making ecobricks is very easy. This is the procedure:

1. Get clean plastic trash then cut into small pieces. why do i have to cut? Smaller size makes it easier to use. Put it in a plastic bottle.
2. First, place the base cracker. Then add more plastic It hardens until it is completely filled.
3. Compact the trash with a knife. The bamboo/wood trick is to place. It's on the outside of the bottle.
4. When the bottle is full, cap it to prevent the contents from spilling out (Wardani, 2018)

DISCUSSION

A. The 3R program's (Reduce, Reuse, and Recycle) impact on management expertise as a result of applying ecobrick

1. Equipment Effectiveness Testing.

A total of 21 children in the fifth grade of elementary school were tested for validity using a testing device using 25 items. Validity arises from these 20 questions. The 20 questions are meant to be used for data collection purposes.

2. Reliability

After confirming its efficacy, the researchers conducted reliability tests and found it to be effective. Based on instrument reliability test results, SPSS achieved a score of $0.85 > 0.6$ on the PG question. This means reliability A tool you can trust.

3. Normality

When testing this normality, the Kolmogorov-Smirnov formula is used. This test is used to determine if the samples are normally distributed. SPSS25.0 version. The window significance level used in the normality test is greater than 0.05. After processing the data, the result of the normality test is determined.

Table 1. Tests of normality

		Kolmogorov-Smirnov			Shapiro-Wilk		
Kelas		Statistic	df	Sig.	Statistic	df	Sig.
Ecobrick	PreTest Eksperimen	.169	10	.200 ^a	.930	10	.452
	Post Test Eksperimen	.284	10	.022	.915	10	.318
	PreTest Kontrol	.189	10	.200 ^a	.926	10	.410
	Post Test Kontrol	.217	10	.200 ^a	.896	10	.198

Sumber: SPSS Versi. 26.0.

Table 4.2 shows the test results. Significant results are known Pre-test panel and values up to $0.452 > 0.05$ significant post-test experimental group maximum $0.318 > 0.05$. Then the pre-test and post-test values of the control class are determined normal distribution.

Mean count on the pretest panel were 53.5 and 54.5 in control class. Therefore, it can be said that the student has the right skills. After learning with different methods, the child is tested to see the final result. Score After testing, the experimental group was 86.5 and the control group was 77.0. Assuming all of the data are significant at a level greater than 0.05 using the normality test, it can be said that the data are normally distributed.

4. Homogeneity Test

Homogeneity test using the Levene test with read a sig (significant) value of more than 0.05. This homogeneity test using SPSS 25.0 for Windows. The data homogeneity hypothesis test, specifically:

H0: The two homogenous variances are equal.

H1: Neither of the variances is homogenous.

The following benchmarks are used in hypothesis decision-making:

H0 is approved if significance is greater than 0.05.

H1 is discarded if significance 0.05.

Table 2. Homogeneity test

Homogen Post test Kelompok Kontrol dan Kelompok Eksperimen

		Test of Homogeneity of Variances			
		Levene Statistic	df1	df2	Sig.
Ecobrick	Based on Mean	.026	1	18	.874
	Based on Median	.048	1	18	.830
	Based on Median and with adjusted df	.048	1	17.586	.830
	Based on trimmed mean	.021	1	18	.885

Sumber: SPSS Versi. 25.0.

Based on the posttest results homogeneity test in table 4.2. Seen that a significant value of $0.874 > 0.05$ explains that 0.874 is more than 0.05, then the posttest data is uniform (homogeneous)

After performing the analytical tests (normality and homogeneity) and knowing that both groups are normally distributed and the two uniform group variances, the next test tests the study hypothesis using an independent t-test. t-test study was conducted to determine the impact of his Ecobrick use in a 3R (Reduce, Reuse, Recycle) program on knowledge-based waste management. Hypothesis testing is performed by hypothesis testing (independent t-tests) post-testing the two classes with $\alpha = 0.05$.

Independent sample t test in order to get see the difference in learning outcomes of each group. The result is a calculated t value of 17.207 and a sig level of 0.05. From the results above, the $t (df) = n-2$ or $20-2 = 18$ score is 2,100. Means t count is greater than t table. From the conclusion that there is a difference in the value of student achievement. This is similar with the claim made by Riswan (in Widiyaningrum & Purwantoyo, 2015) that a student's knowledge of waste management will impact how much they contribute to waste management efforts aimed at maintaining a clean environment. Ecobricks can be used to teach children ecologically appropriate waste management techniques and help mold their character in a way that will help the environment.

This is consistent with Riswan's statement in (Widiyaningrum and Purwantoyo, 2015) Students' understanding of waste management determines the extent to which waste management contributes to environmental cleanliness. Knowledge of waste disposal and recycling. With eco-bricks, they can be used as an eco-friendly learning medium and help shape children's personalities to protect the environment.

The coefficient of determination is used to determine percentages. Effect of independent variable X (using Ecobricks) on variables Dependent Y (waste management knowledge).

**Table 3. R square data
Model Summary**

Mode I	R	R Square	X	Hasil
1	.324 ^a	.105	100%	10.5 %
2	.457 ^a	.208	100%	20.8 %

Sumber: SPSS Versi. 25.0.

The table shows that the control class has a value of 10.5% or $KD = 0.105 \times 100\% = 10.5\%$ and the experimental class has an RSquare value of 0.208 or $KD = 0.208 \times 100\% = 20.8\%$. Can be interpreted after performing an action in RSquare. worth. The experimental class (%) increased compared to the control class where no action was taken.

Evaluate the effect of two variables using Ecobricks Strong after R-squared calculation. A yield of 10.5% was achieved in the control group and a yield of 20.8% was achieved in the experimental group. The R-squared for the experimental class is greater than the R-squared for the control class. This is because students are more interested in learning.

In this case, consistent with Hermawan's statement in (Widyyaningram and Purwantoyo, 2015) that knowledge is well associated with waste management behavior.

Every community is welcome to join in the creation of ecobricks, say Lenkiewicz and Webster in Palupi (2020), along with kids. By creating ecobricks, students, parents, teachers, and school personnel may work together to make a green environment affordable and accessible. Activities using eco-friendly ecobricks can also be incorporated into the curriculum (Maier & Angway, 2015).

FINALITY AND CLOSURE

The conclusions from this study are:

1. There is an effect of using ecobrick in the 3R program (Reduce, Reuse, Recycle) on management knowledge waste based on the calculation results of the independent sample t test in order to see differences in learning outcomes from each group. The result is a calculated t value of 17.057 and a sig 0.05. From these results, the t (df) = n-2 or 20-2 = 18 score is valuable 2,100. Means t arithmetic is greater than t table.
2. Based on the calculation of the coefficient of determination obtained a yield of 10.5% for the control group and the experimental group gained 20.8%. R-Square (%) has increased compared to the control class that had not been done action. It is proven that there are differences in the use of ecobrick in the 3R program (Reduce, Reuse, Recycle) against knowledge of waste management by 20.8%

Researchers can recommend ecobrick learning material to local RT administrators based on the findings of the study, with the goal that they will use them to manage garbage and raise environmental consciousness. also, hope this ecobrick media can be built to work in conjunction with other initiatives to improve the community, the environment, and student learning results.

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