

IMPROVING STUDENTS' ENVIRONMENTAL AWARENESS USING 3R PRINCIPLES

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Abstract People concern toward environmental sustainability is getting decreasing, it is proven by a large amount of waste that is not handled correctly. It is needed training to accustom every people to manage their own garbage at home. The function of the science learning process in the classroom needs to be maximized by training students to process waste into more useful products. This research aims to improve students' environmental awareness through waste management training according to 3R principle. Research method uses quasi experiment one-group pretest-posttest design. Data were collected using questionnaire, observation, and documentation. Sample number is as much as 39 students of junior high school and data analysis uses paired samples t-test, with an error rate of 5%. Research result shows that activity for managing waste into products such as organic fertilizer, handicraft, decorative flower made of paper, flower vase, etc. They have significant influence toward students' concern to the environment. This indicates that students' environmental awareness by training students' ability to process waste using the 3R principle can reduce excessive household waste production. The 3R principle begins with the identification and sorting process of waste to the manufacturing process of the product. Student-made products are useful for their own use and even for sale.

Keywords: Environmental awareness, 3R principle, household waste, useful product

1. Introduction

Waste is a classic pollution problem that is currently faced in some areas. Waste volume is increasing while residual waste resulted from the consumption of urban citizens are not easily decomposed, especially plastic. Increasingly accumulation of plastic waste will cause serious

pollution problem. Urban waste comes from various waste of consumption, industrial activity, or agricultural and farming. The most pollutant source is from household waste [1]. This reality reflects the people's attitude that does not care toward the environment [2]. Various efforts have been conducted by government or environmental organization to train the society's ability in managing waste into useful products [3], however, the society has not accustomed yet in managing their own garbage at home.

Awareness on waste hazard or skill in managing waste is needed to be taught since early childhood. School as a place to develop students' character needs to be optimized in its function as a place to train the waste management. The students will know how to manage waste if they are continuously taught and trained, for instance: garbage is reprocessed into an artwork, resell, reuse, and turned into organic fertilizer [4].

The way in solving the problem of pollution is part of the reduce, reuse, and recycle (3R) principles that can be done easily by students at home and anywhere. Waste management using 3R principles is the ways of managing waste, in the form of reduce, reuse, and recycle. Reduce means to reduce the potency of waste increasing, reuse means to use again useful garbage, and recycle means to manage waste again into useful product [5].

Some recommendations of previous studies show that it needs integration of environmental education and waste management activity in educational institution done directly both in learning process by the teacher or indirectly by outside party. In this way, students will be more active [6,5], students can be pleased and also the awareness for environment will be more increasing [7].

Teaching on how to manage waste through 3R principles can be carried out through discussion forum about environment, project-based activities in class, through separating organic and inorganic waste to be recycled [8]. Waste management using 3R principles is not only used for education, 3R principle can also be applied in industry, community environment,

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development project, etc. [9]. All those fields use 3R principles in order to decrease waste volume from its production activity or goods usage. Reduce, reuse, and recycle principles contain activities that can be

done by the students themselves in their daily activities. Description in waste management through 3R principles is explained on Figure 1.

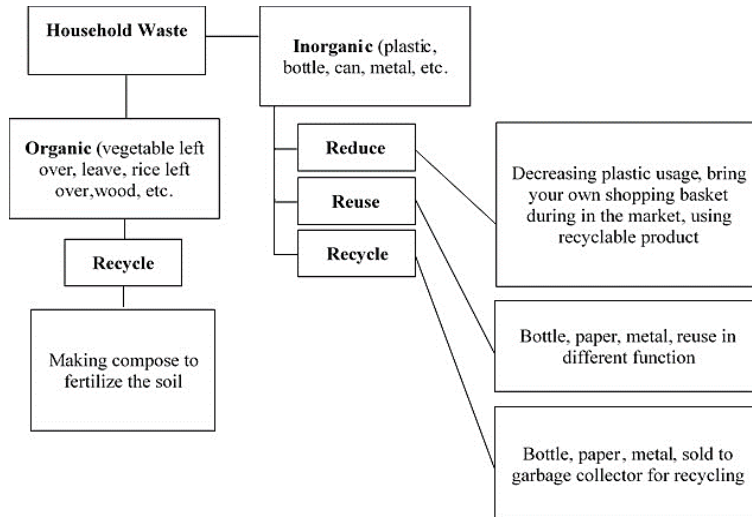


Figure 1. Ways in Managing Household Waste with 3R Principles

The scheme above becomes teacher reference in teaching and training the 3R principles in class for managing household waste at home. Teaching 3R principles can instill students' concern toward environment perseverance at once. Reduce, reuse, and recycle principles of waste management refer to garbage character categorization, which are organic and inorganic waste. Organic waste in the form of residual food, vegetable, and wood which can be destroyed quickly, hence it needs recycle process, so it is destroyed for being used as compost. Inorganic waste is hard to be destroyed such as plastic, glass, or metal, so that it needs to be conducted reduce, reuse, and recycle in the form of reducing waste usage, re-utilize and recycle.

Instilling concern toward environment is important to be done since early age, because it will influence on self-discipline in maintaining hygiene and environmental sustainability in daily life [10,11]. Practice in managing waste at school is expected can influence students' concern toward environmental sustainability. Though learning process in the class, teacher can train students in managing waste according to the 3R principles to foster students' concern toward environment. However, concern toward environmental hygiene is not meet the expectation yet; the students have not been accustomed in utilizing used goods and household waste, so, all type of waste tends to be dumped right away without processing it first.

2. Materials and Methods

The research was a quasi-experiment research using one-group pretest-posttest design to test the significance of training to handle waste using 3R principle toward students' environmental awareness. Research design is as follows.

O1	X	O2
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Explanation:

- O1 : Students' environmental awareness prior given treatment in managing waste training using 3R principles (pre-test)
- O2 : Students' environmental awareness after given treatment in managing waste training using 3R principle (post-test)
- X : Treatment in managing waste training using 3R principles

Quasi-experiment was carried out to the students of junior high school with sample number of 39 students. Data collection used likert questionnaire scale that is contained questions related with environmental awareness. The questionnaire consists of five environmental awareness indicators, which are attentiveness toward waste issues, availability in handling waste, curiosity on the way of managing waste, effort done

in managing waste, and responsibility to maintain cleanliness.

Data analysis used paired samples t-test on 5% significance level to test zero hypothesis stated “there is no significance difference on students’ environmental awareness before and after being given treatment”. Before conducting analysis, data was treated with prerequisite analysis, which is normality and homogeneity test.

3. Results and Discussion

Research Result

Types of Student’s Activities in Handling Waste

Handling waste activity done by student was guided by the Natural Science teacher of Junior High School because Natural Science object study was on environmental pollution lesson. The waste

handling activity done by the student is explained as follows.

1. Selecting waste (reduce)
This activity aimed to distinct organic and inorganic waste. Student was asked to brought waste from home that was come from daily life activities, for instance, used bottle, can, paper, metal, vegetables waste, rice waste, etc. In the school, teacher instructed the students to choose which garbage included organic and inorganic group. Students managed the garbage in groups. The garbage which has been categorized into organic waste and inorganic waste then processed in the next activity.
2. Making organic compose (recycle)
This activity aimed to make solid and liquid compose. Solid compose was made from vegetables waste and rice waste. Whereas liquid compose was made from rice wash leftover. Product made by the students was as shown in Figure 2.



Figure 2. Activity in Managing Organic Waste into Organic Fertilizer

Solid liquid fertilizer made by the student was packed after decaying process for two weeks. While liquid fertilizer from rice wash leftover can be used to watering plants after one week stored.

3. Making handcraft product (reuse)

This activity aimed to handle used goods into more useful product. Product made from, for instance from paper and plastic, are flower vase from can, bag from plastic, etc. The example of product made by the students was as shown in Figure 3.



Figure 3. Activity of Making Handicraft Product from Waste

Tutorial of how to make handicraft from used goods were derived by teacher in YouTube sites. Showing video aimed to show the example of process in making product from used goods that can be followed by the students. Nevertheless, student was also given freedom to make their own desired product aside of what is shown in the video.

Student's Environment Awareness Before and After Being Given Treatment

The following is presented description in environment awareness questionnaire result before and after being given treatment of handling waste training using 3R Principles.

Table 1. Description in Students' Environment Awareness Questionnaire

Aspect	Before Treatment	After Treatment
Mean	41,13	46,72
Variance	21,430	17,524
Minimum	33	36
Maximum	49	53

The Table 1 showed mean value after being given treatment was higher compared to before treatment, variant data before treatment was higher compared to after treatment, minimum value and maximum value after treatment was higher compared to before being given treatment.

Descriptively, there were mean increasing as much as 5,59 after being given treatment. Enhancement significance of mean value after being given treatment was tested using paired samples t-test on 5% significance level. Test of normality data before and after treatment was carried out using Kolmogorov-Smirnov test. Value of normality probability test (sig. 2-tailed) as much

as 0,200. The value showed that data was distributed normal because it was $> 0,05$. Homogeneity test of variance based on mean was carried out through Levene's test. Probability test value of variance homogeneity was derived as much as 0,290. The value showed variant data was homogeneity because it was $> 0,05$.

Based on prerequisite test analysis, it was stated that data was distributed normal and variant was homogeneity in nature. Therefore, parametric statistic test was carried out. The result of paired sample t-test from SPSS statistics is shown in Table 2.

Table 2. The Result of Paired Samples Test in student's Environment Awareness

t-Test	Mean	Std. Deviation	Std. Error Mean	t	df	Sig. (2-tailed)
pretest-Posttest	-5,590	2,750	0,440	-12,692	38	0,000

Drawing conclusion was based on, if probability value (sig. 2-tailed) showed value of $> 0,05$ then H_0 was accepted and H_a was rejected. On the contrary, if probability value (sig. 2-tailed) was $< 0,05$ then zero hypothesis was rejected and alternative hypothesis was accepted.

Result of t test showed that mean value after treatment was higher compared to before treatment with mean margin as much as -5,590. Value of t test was derived -12,692 and significance value (sig. 2-tailed) was as much as $0,000 < 0,05$. This showed that zero hypothesis was rejected and alternative hypothesis was accepted. In other words, there was significance influence of handling waste training using 3R principles toward students' environmental awareness.

Discussion

Waste handling carried out in group by students started from activity in identifying classification for organic and inorganic waste.

Waste selecting activity was kind of reduce principle that aimed to separate garbage according to its nature characteristics, later, it was utilized into more useful product.

Type of product from organic waste made by the students were in the form of liquid organic fertilizer from rice wash leftover and solid organic fertilizer that was made from vegetables waste, leaves, dry grass, and cow dung. The fertilizer was very useful to fertilize the soil. While product type from inorganic waste was made into flower vase out of paper and plastic, car toy out of used bottle, flower pot out of can, etc.

Giving treatment of handling waste training using 3R principles showed significance influence toward students' environmental awareness. Mean value of environmental awareness before treatment was as much as 41,13, while mean after treatment was as much as 46,72. The mean enhancement was significance based on t-test result. Enhancement in environmental awareness was a form of students' attentiveness enhancement toward waste issues,

students' availability in handling waste, and students' intention for responsibility toward environmental hygiene. In this research, gender distinction is not seen as the cause of environmental awareness enhancement, because gender difference do not influence significantly toward students' environmental awareness [12].

The result of this research is in line with the study stated that effort in environmental cleanliness internalization value can be carried out by instilling awareness on waste, thinking of waste and practicing waste handling [13]. They way of instilling environmental awareness will influence student's knowledge. Student's behavior in the school can be formed through law of effect states that behavior followed by satisfaction consequences will be repeated. On the contrary, behavior followed by punishment consequences will not be repeated. The research result answers the discourse about students' environmental awareness on environmental issues that is still low [14]. One of the way can be done is through actual activity in handling waste into useful products [15,16]. The activity can decrease society's habit in dumping waste into gutter, side of the road, and various places those are not appropriate [17,18].

Result of this research stressed that student's character changes was not only carried out through cognitive aspect, but also learning activity that trained skill and real activity also influenced the student's behavior changes. Therefore, character building in the school is needed for balancing between cognitive, affective and psychomotor aspects.

Teaching students' concern toward environment is not just taught to be aware on environmental issues, but also be active in participating environmental protection. Those ways can be integrated in school activity [19; 5]. Teaching models that can be conducted are: give reading materials with environmental theme, ask students to mention potential action they can do to minimize environmental pollution, and perform real action to decrease environmental pollution [20].

4. Conclusion

Based on research result, it was showed that activity in handling waste using 3R principles can influence students' environmental awareness. Type of activity conducted were: selecting waste into organic and inorganic group, making solid organic fertilizer out of vegetable waste and leaves, making liquid organic fertilizer out of rice wash leftover, and making handicraft out of plastic, metal, bottle, patchwork, etc. Activities in handling waste using 3R principles did not just give awareness to the students on the impact of waste pollution issues, but also form real behavior in decreasing household waste in our daily life.

5. Acknowledgements

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