Waste Sorting and Organic Waste Processing Training at SD Muhammadiyah Banyuraden

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Abstract. Recently, garbage has become an emergency problem in Yogyakarta. Piyungan Integrated Waste Processing Site is closed. Hence, there are build-up of waste in several places. This urges the government and community to move to deal with the waste problem. The movement of waste processing and management begin massively in the community. Similarly, this movement needs to be carried out in educational institutions because schools are part of the agents of change in society. The activity method was conducted by providing pretest and post-test assessment, education, and training by Mrs. Neni Widuri from Gowasari Training Center. The participants who participated in training and education were 12 people which was consisted of teacher and staff. The activity was held at SD (Elementary School) Muhammadiyah Banyuraden. The purpose of this community service activity is to provide education and training for teachers and employees of SD Muhammadiyah Banyuraden regarding organic waste processing by making eco-enzymes. The assessment results reveal that socialization and training activities have a significant impact on increasing participants' knowledge about organic waste management and its processing into eco-enzymes. The average increase in knowledge of 12 teachers and employees of SD Muhammadiyah Banyuraden is 49%. Community service activities are expected to make changes to the school environment of SD Muhammadiyah Banyuraden and the environment around the school.

Keywords: elementary school, participant, waste

1 Introduction

The problem of waste has become a global problem that continues to be a concern on a regional, national, and global scale. As the human population grows, this waste problem cannot be ignored. In addition, another factor that contributes to the waste problem which is increasingly serious is a change in the consumerism pattern of the technological progress society. This raises an ironic reality that behind the success of human development, there is another side that is the adverse impact of development, namely environmental problems [8]. In some big cities, a new symptom called NIMBY (Not in My Back Yard) Syndrome emerges, which is a social phenomenon that considers that garbage is no longer one’s business when it is outside one’s house or yard [12].

The World Economic Forum (WEF) predicts that by 2050, the amount of plastic in the ocean will be more than fish. The WEF also estimates that by 2050, the amount of plastic produced globally will be triple [7]. Every year, the volume of waste certainly will always increase along with the pattern of consumerism of society which is also increasing. The Ministry of Environment has recorded that the average Indonesian population produces approximately 2.5 liters of waste per day or equivalent to 625 million liters of the total

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population. Indonesia produced 21.88 million tons of waste in 2021 [13]. The Ministry of Environment and Forestry (KLHK) noted that Indonesia produced 21.88 million tons of waste in 2021, although this number decreased by 33.33% compared to the previous year which was 32.82 million tons [10].

Among all cities in Indonesia, Special Region of Yogyakarta Province is one of the cities that experienced emergency waste problems. A few weeks ago, Yogyakarta City was plagued by garbage for one week. This is due to the blockade by the residents around TPST (Tempat Pengolahan Sampah Terpadu – Integrated Waste Processing Site) Piyungam which caused mountains of garbage at several points [15]. The blockade was done because the volume of garbage entering the site every day was very large. In addition, TPST Piyungan receives waste from Bantul Regency, Sleman Regency, and Yogyakarta City [3]. Meanwhile, the volume of waste in Sleman Regency reaches 738.71 tons every day and it is dominated by household waste [14].

This condition encourages the government to take appropriate action to overcome the waste problem. The mandate regarding regulations and policies related to waste is the Law Number 18 of 2008 concerning Waste Management. Based on the Law Number 18 of 2008, it is stated that everyone has rights and obligations in waste management [1]. The law is further accompanied by Government Regulation of the Republic of Indonesia Number 81 of 2012 concerning the management of household waste and similar types of household waste [6].

Socialization and strategies from the government and non-government organizations regarding waste management are needed by the community. Currently, various waste management policies and strategies have been done, for example; reducing the use of plastic when shopping, providing waste banks, 3R (Reduce, Recycle, Reuse) programs, and others. One of the strategies of the 3R program is to sort organic and inorganic waste and process the organic one into eco-enzymes. Eco-enzymes are a form of waste management by making it into something that has added value. The 3R approach through making eco-enzymes can open new perspectives and insights for the community in managing waste [13].

The implementation of the program can be started from small communities, such as families or schools. The socialization and training were given to schoolteachers with the hope that teachers are able to handle waste, both in the school environment and in their homes. The training for teachers on processing waste into eco-enzymes was carried out at SD Muhammadiyah Banyuraden, Gamping, Sleman. The school has 12 classrooms and 1 library room, with 17 teachers, 1 staff, and 318 students (Kemdikbud 2019).

2 Methodology

These community service activities were held at SD Muhammadiyah Banyuraden. The participant who joined these activities included the teachers and the school staff. The participants of this activity were 6 committees and 12 participants. The activities were carried out by assessing and providing education and training for the participants. The method of the education and training used was participatory action method. The assessment was carried out by means of surveys through questionnaires. The assessment was conducted in two stages, namely pre-test and post-test. The aspects assessed were knowledge about the 3R principles, knowledge about sorting organic and inorganic waste, knowledge about processing organic and inorganic waste, knowledge about making eco-enzymes.

After the pre-test assessment session, socialization, and training on making eco-enzymes were conducted, education and training were delivered by resource persons with competence who were engaged in waste processing and management, Mrs. Neny Widuri from the Guwosari Training Center (GSTC). Mrs. Neny Widuri is one of the trainers in making eco-

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enzyme from GSTC. Guwosari Training Center (GSTC) is a company which is engaged in the waste processing sector, both organic and inorganic waste [4].

3 Results and Discussion

In assessing the knowledge of socialization and training participants, the author provides pre-test and post-test questions. The following are the results of the questionnaire.

Table 1. Table of Questionnaire Results

<table>
<thead>
<tr>
<th>No.</th>
<th>Questionnaire questions</th>
<th>(Pre-test) Percentage of Correct Answers</th>
<th>(Post-test) Percentage of Correct Answers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you know the 3R principles?</td>
<td>42%</td>
<td>92%</td>
</tr>
<tr>
<td>2</td>
<td>Do you know that waste can be turned into an income?</td>
<td>100%</td>
<td>100%</td>
</tr>
<tr>
<td>3</td>
<td>Do you know how to sort waste?</td>
<td>92%</td>
<td>100%</td>
</tr>
<tr>
<td>4</td>
<td>Do you know the various types of inorganic waste processing?</td>
<td>42%</td>
<td>100%</td>
</tr>
<tr>
<td>5</td>
<td>Do you know the types of organic waste processing?</td>
<td>33%</td>
<td>100%</td>
</tr>
<tr>
<td>6</td>
<td>Do you know what eco-enzymes are?</td>
<td>17%</td>
<td>92%</td>
</tr>
<tr>
<td>7</td>
<td>Do you know how to process waste from food and fruit / vegetable waste?</td>
<td>50%</td>
<td>100%</td>
</tr>
<tr>
<td>8</td>
<td>Do you know the benefits of eco-enzyme?</td>
<td>17%</td>
<td>100%</td>
</tr>
</tbody>
</table>

The table above shows that only a few participants answer correctly before the socialization and training actions on waste sorting and making eco-enzymes compared to the answers given after the socialization and training actions. Before activities, half the participants do not understand the concept of 3R (Reduce, Recycle, Reuse). The understanding about 3R is not yet fully familiar among teachers and staff of SD Muhammadiyah Banyuraden. Applying the 3R concept is actually easy but requires awareness of the community itself [2]. While all participants understand that waste processing can be a commercial thing. However, they still do not understand yet how to manage and process waste, moreover organic waste into something of commercial value.

Participants' overall knowledge increase by 49% on average. From the results of the questionnaire, the assessment and the percentage of its increase can be categorized as below.
Table 2. Average Increase in Aspects of Waste Management Knowledge

<table>
<thead>
<tr>
<th>No.</th>
<th>Knowledge Aspect</th>
<th>Percentage Increase in Knowledge</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Knowledge about the 3Rs</td>
<td>50%</td>
</tr>
<tr>
<td>2</td>
<td>Knowledge about the economic value of waste</td>
<td>0%</td>
</tr>
<tr>
<td>3</td>
<td>Knowledge about waste sorting</td>
<td>8%</td>
</tr>
<tr>
<td>4</td>
<td>Knowledge about waste processing</td>
<td>62.50%</td>
</tr>
<tr>
<td>5</td>
<td>Knowledge about eco-enzyme</td>
<td>69%</td>
</tr>
</tbody>
</table>

Looking at the Table 2, the most significant aspect of knowledge improvement is regarding waste processing to eco-enzyme. The results of questionnaires and dialogues during socialization also conveyed that the participants did not fully understand how to process organic and inorganic waste. It was explained in the socialization that in-organic waste such as paper and plastic could be collected and sold to waste banks. Garbage, diapers, and tissues could be made into items such as plant pots. Meanwhile, organic waste such as food waste could be used as magot or animal feed. The making eco-enzyme itself utilized the remains of fresh vegetables and fruits.

The results of the questionnaire as stated in the previous sub-chapter revealed that socialization and training activities could be considered successful. This was because eco-enzyme was something new for teachers at SD Muhammadiyah Banyuraden. Eco-enzyme itself is said to be a fermented liquid from organic waste of fruits, vegetables, vegetable stalks, and other organic waste which has many benefits [5]. Eco-enzyme is a mixture and is a natural fermentation of sugar, fresh fruit or vegetable residues, and water with predetermined doses.

The training activity which was held at SD Muhammadiyah Banyuraden by Mrs. Neny Widuri utilized orange peels and the remains of vegetables that were still fresh and had been washed clean. In addition to providing training on how to make eco-enzyme, the resource person also provided material on the benefits of eco-enzymes, such as cleaning bathroom ceramics, helping to treat several wounds and diseases, such as ambient, and as facial skin care as long as the eco-enzyme was produced correctly. In addition, Eco-enzyme is believed to be able to decompose waste that adversely affects the sustainability of life in rivers.
enzyme or also called waste enzyme is a multifunctional liquid produced from the fermentation of organic waste [11]. After doing this activity, participants are expected to be able to select and sort waste in their environment. In addition to sorting waste, participants are also expected to process organic and inorganic waste appropriately, namely being able to make eco-enzyme independently, both at school and at home. Thus, the 3R principles in management and processing can be a solution to reduce the problem of high volume of garbage in both temporary dumping site and landfills [8].

4 Conclusions

Waste problem is everyone's responsibility. Waste problem needs to be addressed in a wise way through proper processing and management, one of which is providing education, socialization, and training to the community. Education to the teachers and staff of SD Muhammadiyah Banyuraden demonstrates that there are still many people who need education about waste handling. Making eco-enzyme is one alternative waste processing that is relatively easy to do. The benefits of eco-enzyme, besides reducing the quantity of organic waste, it also has many benefits for domestic use. The socialization and training activities conducted is considered to have a significant impact on increasing the knowledge of teachers and education staff of SD Muhammadiyah Banyuraden regarding organic waste processing and making eco-enzyme. The expected suggestion from this activity is follow-up trainings on making eco-enzyme that involves all participants to make their own. This waste processing education activity is also expected to have an impact on the community around the school.

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