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The Pre-service Biology Teachers' Understanding on Organic and Inorganic Waste Management

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Abstract

The study aimed to determine the understanding of the pre-service biology teachers regarding the importance of organic and inorganic waste management for the environment. The method used is a qualitative using questionnaire data collection method. The results showed that the pre-service biology teachers' understanding of organic and inorganic waste management was very high. However, there still needs to be more understanding of how to manage waste properly and its application.

Keywords: Organic waste, Inorganic waste, Waste management, Environment

INTRODUCTION

The environment is a space for all aspects of life, with two components: biotic and abiotic. Biotic components are living things such as humans, animals, and plants. In contrast, the abiotic components are non-living things such as water, air, etc. In these two components, a reciprocal relationship influences each other and is dependent on one another (Wihardjo & Rahmayanti, 2021). Environmental education is an educational program that educates, fosters, and directs students or individuals to understand, awareness, attitudes, and rational and responsible behavior regarding the mutual influence between residents and the environment in various aspects of human life (Widiawati et al ., 2022).

Education is very important because it can provide progress in human thought and actualize themselves. At present, education has developed into a system that is structured in law. Because change develops quickly over time, education is an agent of change. Education is an essential and absolute thing for the progress and welfare of society in the face of change. The function of education in dealing with change is to improve students' ability to think critically and instill new beliefs and values about human thinking. Education in modern times has succeeded in creating a new generation with the ability to think critically, new creativity, an attitude of not giving up easily, good communication, and the ability to deal with change (Indy et al., 2019).

According to the Law of the Republic of Indonesia Number 18 of 2008 concerning Waste Management, what is meant by waste is the residue of daily human activities and/or

natural processes in solid form. This waste is produced by humans every time they carry out their daily activities (Republic of Indonesia, 2018). Waste is still a concern worldwide because waste production is increasing daily, along with the rapid pace of occupation growth. Suppose the right solution is not found in overcoming the problem. In that case, it can impact the surrounding environment. for example, the random disposal of waste in an open environment will result in the accumulation of waste in the environment, resulting in soil contamination and impacting groundwater channels. Likewise, burning waste in open areas will have an impact on air pollution which results in shortness of breath for people close to the area (Department of Environment and Forestry, 2022)

When viewed from the problems above, waste is a frightening threat to life now and in the future. Therefore, education and teaching regarding proper and proper waste management are needed. In carrying out waste management, we must know in advance about the types of waste. Waste can be divided into two, namely organic and inorganic waste. Organic waste comes from the remains of living things and quickly decomposes naturally without human intervention. Organic waste can be said to be environmentally friendly, and even organic waste can be reprocessed into something useful if appropriately managed. However, because it is easy to decompose, organic waste can decompose quickly if it is not managed properly, which can cause disease and unpleasant odors (Febriadi, 2019).

Inorganic waste comes from goods that are no longer used and are difficult to decompose. Inorganic waste that is buried in the ground can cause soil pollution because inorganic waste is classified as a substance that is difficult to decompose. Waste originating from human activities can be organic or inorganic. Examples of organic waste are: food scraps, paper, wood, and bamboo. While inorganic waste, for example plastic, metal, glass, and rubber (Febriadi, 2019).

There are three methods of managing waste: reduce, reuse, and recycle. 3R is just a simple term. But this simple thing can positively impact the waste problem around. Therefore, we love our environment to protect the earth so that it continues to be sustainable and beautiful to look at (Department of Environment, 2022). This research will discuss the understanding of the pre-service biology teachers in managing organic and inorganic waste.

METHOD

This research was conducted at a state university in Indonesia. The research method used is qualitative, with the instrument being a questionnaire on understanding pre-service biology teachers about waste and its types.

RESULTS AND DISCUSSION

Table 1 shows the average amount of waste generated by the pre-service biology teachers in 6 days.

Table 1. The average amount of waste

Type of waste	Amount of waste in gram (g)	Amount of waste in kilogram (kg)
Organic	13206.18	13.206
Inorganic	24622.86	24.422
Total	37829.05	37.829

Pre-service biology teachers produce an average of six days of waste with a total of 37.829 kg, with details of 13.206 kg of organic waste and 24.422 kg of inorganic waste. The ratio of organic and inorganic waste is 65% versus 35%. The organic waste produced is fruit peels, fish bones, chicken bones, and vegetable scraps. The resulting inorganic waste includes aqua bottles, aqua cups, and several other types of plastic. If you look at the comparative ratio, pre-service biology teachers produce more waste that is difficult to decompose by nature. If this is always done without proper handling, it will cause several problems, such as floods and other natural disasters. Therefore, appropriate waste management is important to reduce and prevent some of these negative impacts. So, the need for education or teaching about the importance of waste management in the student environment. Besides minimizing the accumulation of waste by carrying out proper waste management, you can get several other benefits, such as earning money from selling plastic items with economic value, such as plastic bottles and cups.

Figure 1 and Figure 2 show that the pre-service biology teachers' understanding of waste and its types.

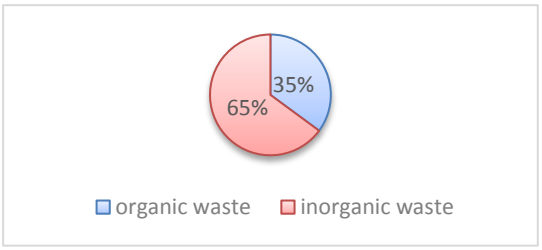

Figure 1. Ratio of organic and inorganic waste

Figure 2. Understanding of organic and inorganic waste

Based on the results of the questionnaire that has been carried out, the knowledge of pre-service biology teachers regarding organic and inorganic waste is 100%. Pre-service biology teachers are answering knowing means that they have good knowledge about waste and its types. However, based on Figure 3, only a few pre-service biology teachers separated organic and inorganic waste in their waste, namely around 31.3% and 68.8% did not separate waste, while based on Figure 3, 100% of pre-service biology teachers considered it essential and necessary to separate rubbish.

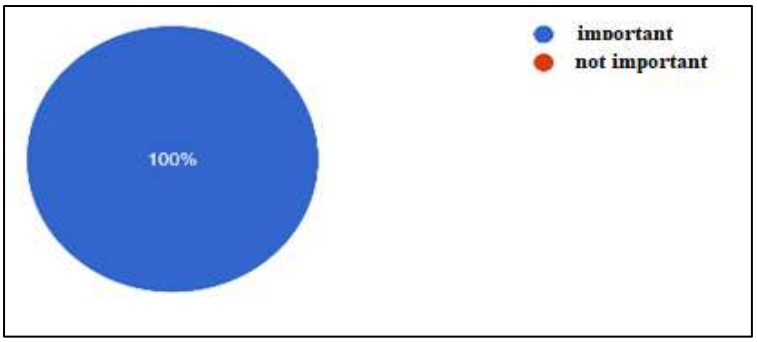

Figure 3. The importance of separating organic and inorganic waste

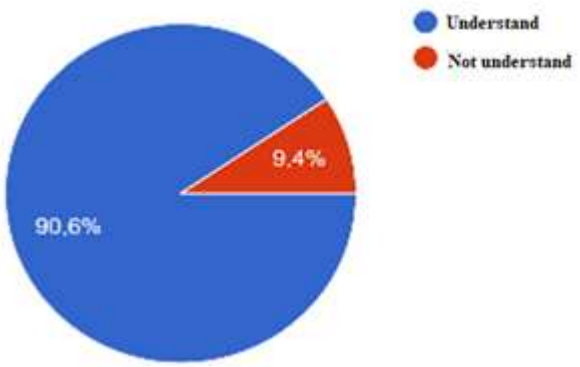

Figure 4. Understanding of waste management

Figure 4 also shows that pre-service biology teachers know about waste management, with 90.6% answering they know and 9.4% do not know about waste management.

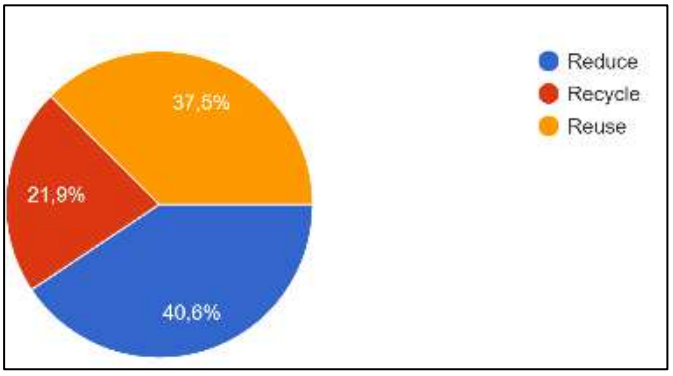

Figure 5. Type of management ever done

Figure 5 shows that the most common management types are reducing as much as 40.6%, reusing 37.5%, and recycling 21.9%. The pre-service biology teachers usually apply the reduced concept by reusing unused items such as cardboard, bubble wrap, or disposable plastic that can be reused for other purposes or selling these items.

Pre-service biology teachers also know several examples of recycling processing, such as turning waste into compost to be used as fertilizer for plants, seen in Figure 6, and other types of management, such as creating a waste bank.

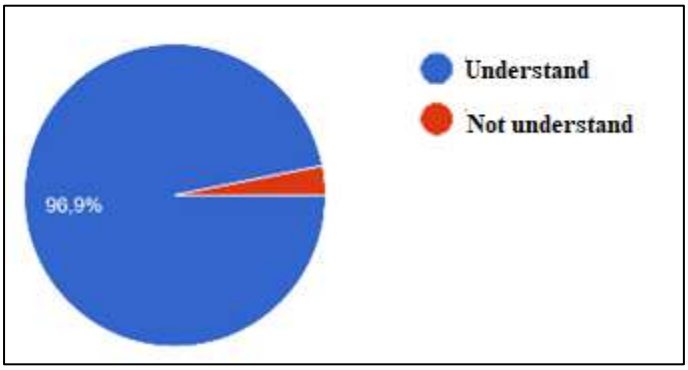

Figure 6. Understanding about compos

The results of the questionnaire distributed in Figure 7 shows that as many as 75% of respondents have good behavior toward waste management. However, Figure 8 shows that only 37% have implemented the segregation of organic and inorganic waste in their respective environments. Based on Figure 8 shows that due to a lack of motivation, sorting organic and inorganic waste takes work. According to Law No. 18 of 2008 concerning Waste Management, the definition of waste management is a systematic, comprehensive, and continuous activity which includes reducing and handling waste to improve public health and environmental quality and make waste a resource (Republic of Indonesia, 2018). Based on this, waste management is very important because it has a big impact.

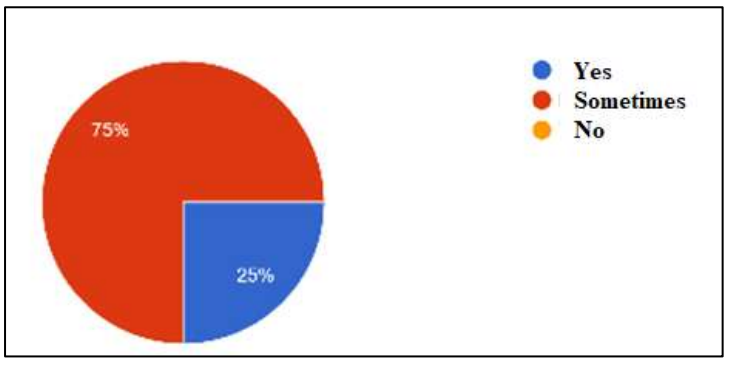

Figure 7. The habit of picking up trash

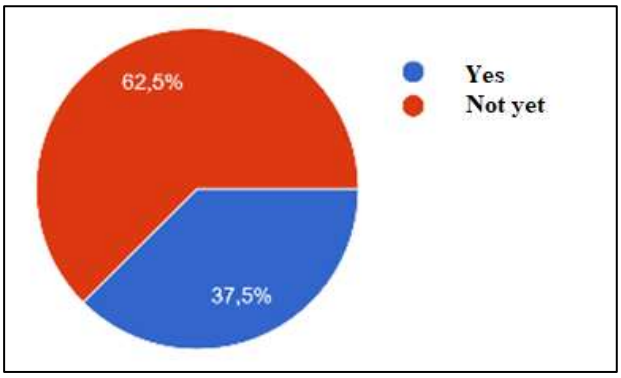

Figure 8. Waste sorting

Waste management can be divided into two types: Waste segregation is carried out by separating organic waste from inorganic waste and placing them in different containers. Sorting trash is important because we can find out which waste can still be used and utilized. Waste segregation is better done from the source, including household and personal waste (Sujarwo, et al., 2014). Based on the questionnaire results, only a few respondents did waste sorting. Waste processing can be done by applying the 3R concept (Reuse, Reduce, Recycle). Reuse, namely the reuse of certain wastes that can still be used; for example, plastic bottles are used as plant pots. Reduce is an effort to reduce the waste generation in all respects and reduce existing waste. Recycle, namely using certain waste to be processed and recycled so that it becomes something useful; for example, organic waste becomes compost, and inorganic waste becomes craft materials (Sujarwo et al., 2014).

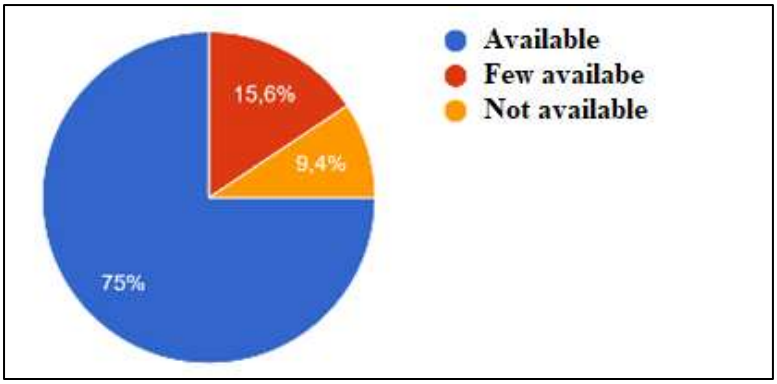

Figure 9. Availability of trash

Figure 9 shows that the average environment where pre-service biology teachers live has adequate waste disposal facilities. Waste management in an area will impact the community and, of course, the area's environment. Of course, there are positive and negative influences. Good waste management will positively influence society and the environment; for example, organic waste can be used as compost as organic fertilizer. Conversely, untreated waste will become a breeding ground for disease vectors, such as flies, rats, insects, and fungi (Utami & Mardikanto, 2016).

CONCLUSION

Based on the results and discussion conclude that the pre-service biology teachers' understanding of organic and inorganic waste management was very high. Additionally, waste management is very important for the environment and has a significant impact if waste is not managed. The basic thing we can do is a separate organic and inorganic waste. So that waste can decompose properly and not accumulate so that it can become a hotbed of disease and can cause disasters such as floods. Pre-service biology teachers already understand this concept, but its application could be more extensive and needs improvement.

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