

The Implementation of Global Citizenship Education Through Strengthening Circular Economy Values as an Effort to Achieve Sustainable Family Resilience in Sukodermo Village and Kertosari Village, Pasuruan Regency

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ABSTRACT

Sukodermo Village and Kertosari Village have abundant natural resource potential. However, behind this abundant potential is a problem of cleanliness, namely the large amount of waste that needs to be appropriately managed. Community service in Sukodermo Village and Kertosari Village aims to instill public awareness of global issues, especially the environment, by strengthening the circular economy as a global action. This service is carried out through a gradual Global Citizenship Education (GCED) approach, including surveys, pre-tests, socialization, training, post-tests, and focus group discussions (FGD). This community service program evaluates the level of community knowledge and interest in various environmental education topics. Pre-test data shows that most participants need more knowledge about Global Citizenship Education (GCED), circular economy, and organic waste management. Furthermore, post-test data shows a significant increase in participant knowledge after the intervention program, where previously, the community only had an understanding level of 10% to 46.7%, increasing to 90% to 96.7%. Finally, the FGD that was conducted successfully produced a collaborative design for all levels of the village to jointly realize a Village that has global awareness and implements a circular economy as an effort to care about environmental issues and improve welfare. Overall, these results show a significant increase in knowledge and interest in implementing environmental education and circular economy programs in Sukodermo Village and Kertosari Village, which can contribute to the development of better environmental education.

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INTRODUCTION

Pasuruan Regency, located at coordinates 112°30'–113°30' East Longitude and 7°30'–8°30' South Latitude, has an area of 1,474.015 km². With a growing population, this regency produces 53,830.17 tons of waste yearly (SIPSN, 2023). The high amount of waste reflects a significant challenge in waste management and environmental sustainability. This challenge is also felt at the village level, particularly in Kertosari Village and Sukodermo Village, which face similar issues with varying intensities.

Sukodermo Village is located in Pasuruan Regency, East Java, Indonesia, about 34 km from Brawijaya University. Geographically, Sukodermo Village is situated in a lowland area of approximately 182.76 hectares or 1,827,600 square meters. The boundaries of Sukodermo Village are as follows: to the north, it borders Kayoman Village; to the south, Putran Village; to the west, Pucang Sari Village; and to the east, Karangnongko Village.

Kertosari Village is located in Purwosari District, Pasuruan Regency, East Java. Kertosari Village is one of the villages in Purwosari District, which comprises 14 villages and one sub-district, covering an area of 59.870 hectares and situated at an altitude of 100-500 meters above sea level. Kertosari Village, which borders Purwosari Village to the north, Cowek Village to the east and south, and Tejowangi Village to the west, has unique geographical and topographical characteristics (Yunita et al., 2023).

Both villages have significant potential in various sectors, particularly agriculture, with green rice fields and fertile farmland expanses. Most of the population are farmers who cultivate food crops such as rice and corn, their primary income sources. The villages also show significant infrastructure development with various public facilities, such as educational institutions, health centers, and village halls that meet the community's needs. Good transportation access also facilitates better connectivity between the villages and nearby cities, supporting the growth and welfare of the village communities.

Despite their various potentials, Sukodermo and Kertosari face problems that must be addressed. One major issue is the need for more community awareness in waste management. Currently, the community only sorts of waste without effective processing, leading to increasing waste generation, environmental pollution, and potential health problems. Besides environmental and health issues, both villages face limited knowledge and access to quality education (Khoiriyah, 2021). The lack of education on sustainability and global responsibility hampers the community's understanding of the importance of environmental preservation and the implementation of circular economy concepts. As a result, these villages experience negative impacts such as environmental pollution, rising non-communicable diseases, and declining quality of life.

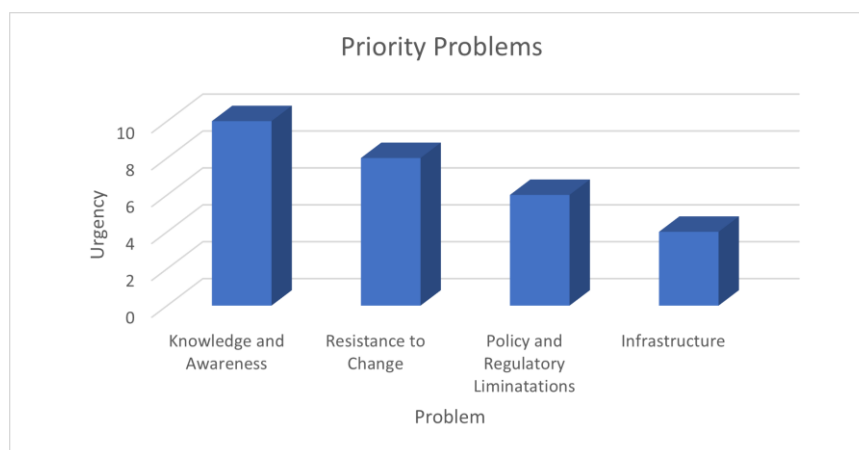


FIGURE 1. Priority Problems Diagram

Our team has created a problem priority chart to help visualize and rank problems according to priority level. This chart is created by adjusting the urgency of the service partners. To address these problems, a comprehensive approach is needed through the implementation of Global Citizenship Education (GCED) (Irayanti et al., 2023). In this context, GCED becomes increasingly crucial in equipping individuals with the knowledge, skills, and attitudes needed to participate actively in global society. GCED raises awareness of global issues and emphasizes the importance of local actions to create positive change (UNESCO, 2024). To realize this vision, integrating the values of healthy living and a circular economy can be an effective strategy to improve the quality of life and promote a creative economy at the village level (Irayanti et al., 2023). This approach also aims to raise community awareness and knowledge about waste management and healthy living patterns, encouraging more effective waste processing by applying circular economy concepts and improving the overall quality of life.

Through comprehensive education and training, it is expected that the communities of Kertosari and Sukodermo Villages can understand and implement more environmentally friendly and healthy practices. Implementing healthy living and circular economy values in education will help create communities that are more aware of the importance of environmental sustainability. With strong cooperation between the village governments, the community, and various related parties, this program is expected to have a sustainable positive impact on both villages, encouraging them to develop into healthier, more competitive, and sustainable communities (Komang & Lasmi, 2024).

METHOD

The implementation includes activities such as socialization on the importance of clean and healthy living and circular economy, campaigns to encourage people to adopt healthy lifestyles, environmental schools to provide in-depth knowledge on healthy living and circular economy and practical implementation of knowledge on waste management (Darmastuti et al., 2021). The objectives of these activities are to provide the community with an understanding of the importance of healthy living and a circular economy, encourage community participation in adopting a healthy lifestyle, and apply knowledge in waste management. The expected outputs include increased understanding and motivation of the community to adopt healthy living practices and utilize circular economy opportunities through applying Global Citizenship Education (GCED) aspects such as cognitive, affective, and psychomotor (Sutrisno et al., 2023).

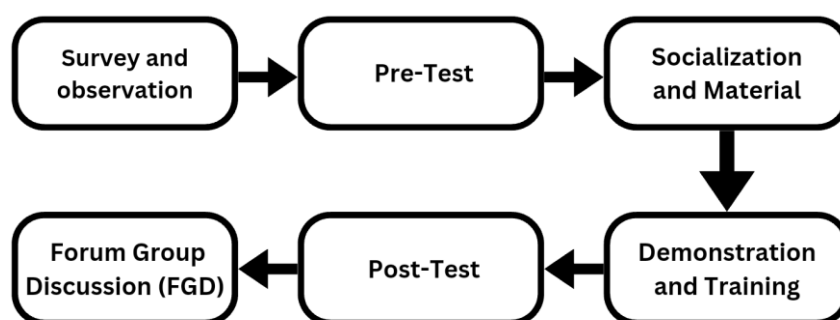


FIGURE 2. Flowchart of the stages of community service program.

The community service program was conducted from July 1, 2024, to July 31, 2024, including survey and observation, pre-test, socialization and materials, demonstration and training, post-test, and Forum Group Discussion (FGD). The program involved lecturers, journalists, and 26 male and female students who helped prepare for the event. The purpose of this preparation was also to increase the contribution of the community service program team and students involved in deepening the knowledge gained on campus before being applied to the people of Sukodermo Village and Kertosari Village during the demonstration. A

total of 43 participants attended the day of the global citizenship education (GCED) socialization on July 20-21, 2024, to increase community knowledge and awareness of environmental issues.

Survey and Observation

Surveys and observations include surveys using Google Forms regarding the amount of waste generated by the people of Sukodermo Village and Kertosari Village, waste problems, and their willingness to cooperate with stakeholders related to waste management. Observations were also carried out to find out the conditions of the partners directly; observations were made three times before the community service team went directly to overcome partner problems. This survey and observation were carried out to ensure the community service team would get actual data on partner conditions.

Pre-Test

The Pre-Test was given to the people of Sukodermo and Kertosari Villages to determine the understanding of the community related to knowledge about Global Citizenship Education through the application of circular economy programs. The questions given include the community's understanding of Global Citizenship Education (GCED), circular economy, and examples of circular economy applications, such as processing organic waste into animal feed, processing straw and corn stalks into animal feed silage, processing fruit peels into eco-enzyme, and processing used cooking oil into aromatherapy candles. This Pre-Test consists of six multiple-choice questions and two description questions. Participants were prohibited from seeking answers from sources other than their knowledge; this was intended to ensure the validity of the data obtained. The Pre-Test lasted for 10 minutes, and participants were required to submit the Pre-Test results when the time was up.

Campaign

Campaigns were given in Sukodermo Village, Kertosari Village, and Instagram social media to invite all levels of society to care about global issues as part of the global community and apply circular economy as a form of global action in overcoming existing global issues. The campaign in Sukodermo and Kertosari Villages was delivered during the presentation of the community service program at the Sukodermo and Kertosari Village Halls, which was presented through PPT and video screenings containing invitations to care about global issues as part of the global community and apply circular economy as a form of global action. The campaign video made by the community service team was also shared on social media to encourage the people of Sukodermo and Kertosari Villages and the wider community.

Socialization and Material

The material was given to the people of Sukodermo Village to increase their understanding of global citizenship education and the circular economy. This was to foster awareness as global citizens who care about global issues and can apply the circular economy as a form of global action to deal with global issues. This material session was delivered through presentations on the circular economy and Global Citizenship Education.

TABLE 1. Presentation subject and speaker

No	Material	Speaker
1.	Global Citizenship Education	Abdullah,S.Sos., M.Hub.Int
2.	Study Case	Dano Purba,S.Sos.,M.Sos and Yustika Citra Mahendra, S.sos., M.A.
3.	Circular Economy	Satria Akbar Pangestu, Dinar Ayu Sekar Pawening, and Cahyo Ilham Firmansyah Subagio

Training and Demonstration

Training and demonstrations on organic waste processing were given directly to the people of Sukodermo Village and Kertosari Village so that the community could better understand the practice of processing organic waste into products with high selling value. The demonstration sessions included making silage from straw waste, eco enzymes from fruit peels, compost from dried leaves, processing cooking oil used for aromatherapy candles, and making vermicompost fertilizer.

A. Processing straw and corn stalks into silage as an alternative animal feed

Silage is a method of preserving forage through anaerobic fermentation in silos with high water content (60-70%) and acidic conditions (Rokhayati, 2023). In addition to preserving, silage also increases the digestibility of forage during the fermentation process (Jabar et al., 2023). Fermentation decomposes the complex structure of the forage physically, chemically, and biologically so that complex materials become simpler and feed digestibility increases (Hasan & Setiawati, 2024). Additives in the form of water-soluble carbohydrates (WSC) can be added to accelerate the ensilage process. The addition of additives is necessary to ensure adequate WSC content for successful ensilage (Mustika & Hartutik, 2021).

B. Utilization of fruit peels into eco-enzyme

Fruit peels can be used as an eco-enzyme by processing enzymes from organic waste, such as fruit and vegetable scraps, sugar (brown sugar, brown sugar, or cane sugar), and water as an organic cleaner. Eco Enzyme is dark brown with a strong sweet and sour fermentation aroma and can substitute chemical cleaning products (Septiani & Oktavia, 2021). The use of chemical cleaning products pollutes water, rivers, and ecosystems. In contrast, Eco Enzyme, produced from organic materials without chemicals, is environmentally friendly because it can be decomposed naturally. The principle of making Eco Enzymes is similar to composting, but water is added as a growth medium to produce an easier liquid. The advantage of Eco Enzyme is that it does not require a large area for fermentation like compost and does not require a unique composter tub (Jelita, 2022).

C. Utilization of dry leaves into compost fertilizer

Dry leaves can be utilized as compost by processing dry leaves from the weathering of various organic materials such as leaves, reeds, and straw, which will decompose into compost. Compost fertilizer is proven to be more environmentally friendly because it can reduce air pollution due to the burning of dry leaves and maintain soil fertility levels. In addition, compost fertilizer can also be an alternative to chemical fertilizers (Habib et al., 2022).

D. Manufacture of kascing fertilizer

Organic waste, especially household waste, can be turned into beneficial fertilizer by utilizing worms to decompose it. A worm bin, coco peat or other media where worms live, ANC worms, and all kinds of organic waste/animal waste are needed for this. This method will produce vermicompost fertilizer and worm tea (liquid vermicompost), which benefits plants.

E. Processing used cooking oil into aromatherapy candles

Involves refining the oil and blending it with essential oils and wax to produce candles with therapeutic properties. The paper should discuss the chemical processes involved in refining the oil, the benefits of using recycled oil, and the market potential for such candles (Kenarni, 2023). In addition, it would be beneficial to discuss safety considerations and the practice's environmental impact (Bachtiar et al., 2022).

Post Test

The post-test was given to the Sukodermo Village community to determine the community's understanding of global citizenship education through the application of circular economy programs after getting the material conducted in the previous session. Participants are prohibited from looking for answers from sources other than those based on their knowledge. This is intended to ensure the validity of the data obtained. This Pre-Test lasts for 10 minutes, and participants are required to submit the Pre-Test results when the time has expired.

Forum Group Discussion (FGD)

Forum Group Discussion is a focused discussion conducted to discuss something to identify problems. The community service team invited the people of Sukodermo Village and Kertosari Village to discuss environmental issues, especially the waste problem that occurred in Sukodermo Village and Kertosari Village; this discussion was also based on data collected previously. In this discussion, the community service team and the people of Sukodermo Village and Kertosari Village tried to identify waste problems and find the best solution to overcome them. This discussion was attended by various elements of society, ranging from BUMDES representatives, TPS managers, RT heads, and residents of Sukodermo Village, while PKK mothers attended the discussion in Kertosari.

Implementation

In the implementation phase of this program, there are two main approaches used in applying the circular economy concept in Kertosari Village:

1. Worm Farming as Circular Economy

This implementation involved two cattle farmers in the village who were given 10 kg of worm seeds. Cow dung is used as worm feed, which is mixed with household organic waste. The goal of this implementation is to create a sustainable cycle of organic waste utilization, which converts waste into economically valuable products, and provides additional income for the community.

2. Used Cooking Oil Waste Bank Management

This implementation is carried out by PKK women by collecting used cooking oil from households. The oil is sold to an exporting factory, and some is used to make aromatherapy candles. This activity not only provides an additional source of income, but also educates the community about waste management as part of the circular economy concept.

This program is also associated with Global Citizenship Education, aiming to raise awareness of villagers as global citizens who care about global and environmental issues. Materials on circular economy and Global Citizenship Education were delivered through presentations to the villagers. Interestingly, the program implemented by the team successfully presented creative and sustainable solutions to address the issues faced by the community. The community-based approach, which directly involves the local population, ensures a sense of ownership and long-term sustainability for the program. By applying the concept of a circular economy, this initiative not only helps reduce waste but also provides additional economic value to the community. The integration of local knowledge with modern technology and the empowerment of housewives in waste management further demonstrates the significant environmental and economic impact of the program (Mulyani et al., 2024). Overall, the program is highly relevant to the current needs of the community and offers positive long-term benefits.

Monitoring and Evaluation

Monitoring and evaluation will be conducted to assess the effectiveness and impact of the program. Monitoring involves direct observation and collecting feedback from the community, while evaluation is

conducted to measure the program's success based on predetermined indicators. The results of monitoring and evaluation will be used for future program improvements. The community service team conducts regular monitoring and evaluation by directly observing the circular economy implemented by Sukodermo Village and Kertosari Village people. The community service team has also helped select the person in charge of each village chosen to help monitor the implementation of the circular economy in Sukodermo Village and Kertosari Village.

RESULT AND DISCUSSION

The community service program provides renewal that can be felt by the people of Kertosari and Sukodermo villages through the novelty results that have been given. Novelty results in the form of Project-Based Learning (PBL) and partner collaboration have been implemented to provide synergy through understanding and developing the local economy. Project implementation of the circular economy through many programs that can be implemented by the community through socialization, demonstrations, and learning media that have been made in the form of modules. Partner collaboration through Village-Owned Enterprises (BUMDes), Community Self-Help Groups (KSM), and Capunglam is a novelty for the people of Sukodermo and Kertosari villages to help and support the implementation of GCED through a circular economy. The collaboration is carried out as a form of community empowerment by integrating the values instilled in GCED, which can create positive impacts through sustainability programs.

TABLE 2. Pre-Post Intervention

Pre-Program Intervention	Post-Program Intervention
Interventions carried out in the form of identifying issues faced by the Sukodermo village community and Kertosari village at this time, focusing on community problems in dealing with environmental and economic issues. Socialization and collaboration with village officials, community leaders, and partners to gain support during the community service program. Through Project-Based Learning (PBL), collaboration strategies are carried out with partners to implement global issues in the projects to be implemented.	After the program was implemented, an evaluation of Project-Based Learning (PBL) was conducted to determine the increase in community understanding of global issues through the implementation of GCED. The development of a sustainability program is carried out through mentoring to provide support to the community so that it can become a replication model to become a pilot village and can be applied as a sustainability program.

Survey and Observation

The initial phase of this community service program involved an in-depth survey and observation process in Sukodermo and Kertosari villages. This stage aimed to gather comprehensive data on current waste management practices, the community's level of awareness regarding the concepts of global citizenship and circular economy, and the community's readiness to engage in sustainable practices. The survey conducted through Google Forms focused on understanding the amount of waste generated by households, the main challenges associated with waste disposal, and the community's willingness to cooperate with stakeholders in waste management initiatives. This digital approach ensured a wider reach and ease of data collection among the participants. Below is the data on the amount of waste the community generates daily.

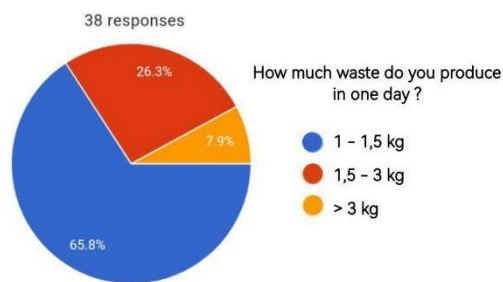


FIGURE 3. The results of the waste community survey.

Direct observations were conducted alongside the survey through three separate visits to the two villages. These observations were crucial to assess the field conditions related to waste management, identify critical areas that require attention, and validate the data collected from the survey. The observations included interactions with local waste management officers, landfill visits, and informal discussions with villagers. The data obtained from the survey and observations revealed several significant findings. Firstly, it was revealed that while there is an essential awareness of waste management issues, understanding the circular economy and global citizenship principles still needs to be improved. Most residents needed to become more familiar with concepts such as eco-enzyme production, silage making from agricultural waste, and the economic potential of these practices.

In addition, the willingness to engage in collaborative efforts for better waste management is high. However, there are also significant gaps in knowledge and resources that can enable communities to shift to more sustainable practices effectively. These findings emphasize the need for targeted educational interventions and practical demonstrations incorporated into the program design. The data collected served as a baseline reference for adjusting the content of socialization sessions and practical training workshops, ensuring that they address the specific needs and challenges identified by Sukodermo and Kertosari.

Pre-Test

In this section, we analyze the results of the Pre-Test, attended by 30 participants from Sukodermo Village and Kertosari Village. This pre-test measures the participants' initial knowledge of global citizenship education (GCED) and circular economy before being given socialization materials. The following are the details of the Pre-Test results based on the six questions asked:

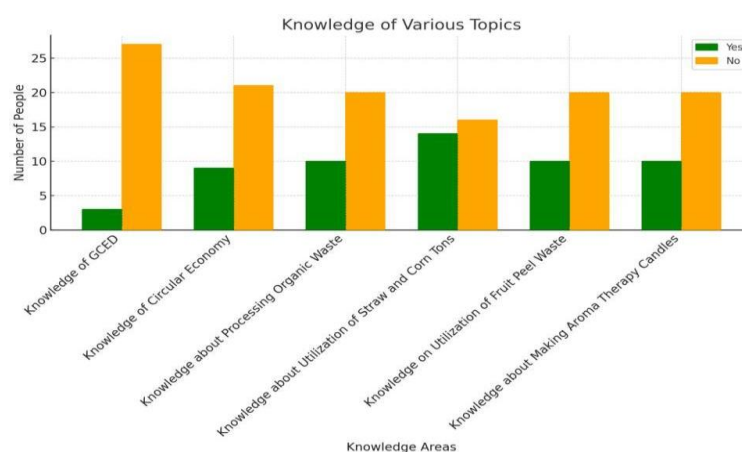


Figure 4. Pre Test Global Citizenship Education (GCED) and Circular Economy

The Pre-Test results showed that most participants needed more knowledge about Global Citizenship Education (GCED) and circular economy. Of the six questions asked, only a tiny percentage of participants knew the concept of GCED, with only 10% answering "Yes." Knowledge of the circular economy was also low, with only 30% of participants answering "Yes."

In addition, knowledge of the practical implementation of a circular economy, such as processing organic waste into animal feed, animal feed silage, eco-enzyme, and aroma therapy candles, was also relatively low, with most participants answering "No" to each question. This suggests that these concepts still need to be introduced to the people of Sukodermo Village and Kertosari Village

This finding underscores the importance of more intensive socialization and training to increase community understanding and involvement in GCED and circular economy-based programs. The Pre-Test results also provide a solid basis for measuring the effectiveness of the interventions to be carried out through the socialization and training programs organized.

Socialization and Material

Socialization and material provision are essential stages of the community service program in Sukodermo Village and Kertosari Village. The purpose of this activity is to provide the community with knowledge and understanding of Global Citizenship Education (GCED) and the circular economy so that people can be more aware of their role as responsible global citizens on global issues, especially those related to the environment.

The socialization was held in two sessions on July 20 and 21, 2024, with participants from various backgrounds, including youth, adults, and village government representatives. This activity began with the delivery of material by the community service team explaining Global Citizenship Education. Then, the community service team invited participants to discuss case studies related to applying GCED in various regions. Furthermore, the community service team delivered the material on the circular economy, which explained the basic concepts of circular economy, its benefits, and examples of applications relevant to the conditions in these villages, such as processing organic waste into products with economic value.

The materials were delivered using various methods to ensure a comprehensive understanding from the participants, such as visual presentations to clarify concepts, question and answer sessions, role plays, and practical demonstrations of organic waste processing. Participants showed high enthusiasm during the socialization; many actively asked questions and discussed and showed great interest in the material presented. At the end of the activity, participants were allowed to try hands-on organic waste processing techniques such as composting and eco-enzyme, which improved their understanding and provided practical skills that can be applied in their environment.

This socialization and material provision increased the understanding and awareness of the people of Sukodermo Village and Kertosari Village about GCED and the circular economy. This activity showed that the community became more aware of their responsibilities as global citizens and motivated to apply the circular economy concept in their daily lives. This was shown by a significant increase in participants' understanding after attending the socialization. This stage has positively contributed to community service efforts to build a community more concerned about global issues and committed to maintaining environmental sustainability.

Campaign

The campaign delivered to the community was presented through educational videos delivered at Sukodermo Village Hall, Kertosari Village Hall, and the community service team's social media. The video included an invitation to apply global citizenship education and circular economy, how to apply circular economy, and an in-depth understanding of global issues. This campaign succeeded in encouraging the community to be more enthusiastic about participating in the program from the community service team; the large number of participants in the series of community service team events evidence this.

Training and Demonstration

During the training and demonstration phase, Sukodermo Village and Kertosari Village participants received practical training to enhance their understanding and skills in implementing the circular economy concept. This session provided participants with not only theoretical material but also invited them to engage directly in the process of creating various products that have added value from materials that were previously considered waste.

Overall, the training and demonstration activities went very well. The participants showed great enthusiasm in following every stage of the training. They actively asked questions and discussed and made every effort to practice the knowledge that had been imparted. Many of them expressed their interest in applying the results of this training in their daily lives.

The demonstration in this activity aims to provide the community with a practical understanding of how to process organic waste into high-value products. Participants are expected to see the processing firsthand, making applying the knowledge they have gained daily easier. The demonstration activities included the processing of straw and corn stalks into silage, the utilization of fruit peels to produce eco-enzyme, the use of dry leaves to create compost, the production of worm castings fertilizer, and the processing of used cooking oil into aromatherapy candles.

Processing straw and corn stalks into silage as an alternative animal feed



FIGURE 5. Silage making activity

The first demonstration is the processing of straw and corn stalks into silage. Silage is a method of preserving green fodder for livestock through anaerobic fermentation. This process is carried out by mixing straw or corn stover with carbohydrate-rich additives to accelerate fermentation. Participants were allowed to see firsthand how this process is carried out, from the preparation of materials to the filling of the silo. This process results in high-quality animal feed that can be stored for a long time, reducing agricultural waste.

Utilization of fruit peels into eco-enzyme



FIGURE 6. Eco enzyme making activity

The following demonstration utilizes fruit peels to create eco-enzymes. Eco-enzyme is a versatile liquid produced from the fermentation of organic waste, such as fruit and vegetable peels with sugar and water. This liquid can be used as an environmentally friendly natural cleaner. Participants are taught how to make

eco-enzymes, starting from the selection of materials and the fermentation process to its application in daily life. The advantage of eco-enzymes is their ability to replace chemical cleaning products, thereby helping to reduce environmental pollution.

Utilization of dry leaves into compost fertilizer



FIGURE 7. Compost fertilizer making activity

In this demonstration, participants are invited to utilize dry leaves, which are usually considered waste, to create beneficial compost for plants. This process involves the natural decomposition of dry leaves, which produces high-quality organic fertilizer. Participants learn to collect, arrange, and process dry leaves into compost. The resulting compost can enhance soil fertility while also reducing the need for chemical fertilizers.

Manufacture of kascing fertilizer



FIGURE 8. Kascing fertilizer making activity

Another demonstration is the production of worm castings, an organic fertilizer produced from the decomposition of organic waste by worms. Participants were introduced to the concept of worm farming and invited to see firsthand how worms work to break down organic waste into nutrient-rich fertilizer. In addition to solid fertilizer, this process also produces worm tea, a liquid that can be used as a liquid fertilizer for plants. Participants are taught how to prepare a worm bin, choose the suitable worms, and maintain and harvest vermicompost.

Processing used cooking oil into aromatherapy candles



FIGURE 9. The activity of recycling used cooking oil

The final demonstration is the process of using cooking oil to make aromatherapy candles. Used cooking oil, usually discarded, can be processed into high-value products such as aromatherapy candles. Participants are taught how to filter the used oil, mix it with natural ingredients like fragrances and wax, and then use the molding process to create candles. The aromatherapy candles produced are not only environmentally friendly but also have a reasonably high market value.

This demonstration activity is expected to inspire the communities of Sukodermo and Kertosari villages to apply the principles of a circular economy in their daily lives. In addition, the results of this training and demonstration are expected to improve the community's welfare by utilizing waste to create economically valuable products.

Post Test

After the socialization and provision of materials related to Global Citizenship Education (GCED) and the circular economy, a post-test was conducted to evaluate the improvement in the community's understanding. This post-test was attended by 30 participants, who were the same as those who had attended the pre-test. The questions asked in the post-test are similar to those in the pre-test, which compares knowledge before and after implementing the activities. Here are the results of the Post-Test:

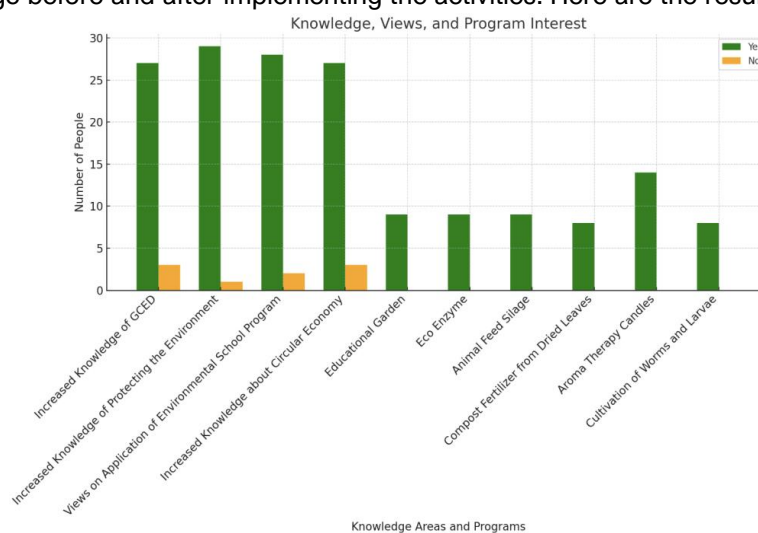


FIGURE 10. Pre Test Global Citizenship Education (GCED) and Circular Economy

The results of the Post-Test indicate a significant improvement in participants' understanding of GCED and the circular economy. As many as 90% of participants reported that the material presented enhanced their knowledge about GCED, a drastic increase from just 10% in the Pre-Test. This demonstrates that the outreach successfully raised participants' awareness of their roles as global citizens. Participants' knowledge about the importance of protecting the environment also experienced a significant increase, with 96.7% of participants stating that their understanding has improved. Most participants also agreed that environmental school programs need to be implemented in daily life.

In terms of the circular economy, 90% of participants stated that their knowledge increased after attending the socialization. This shows the effectiveness of the materials and demonstrations provided during the activities. For the circular economy program that is most appealing to participants, the creation of aromatherapy candles from used cooking oil garnered the most attention, with 46.7% of participants choosing it as the program they would implement. This indicates the public's interest in practical solutions directly benefiting daily life. Overall, the results of this Post-Test indicate the success of the socialization program in enhancing the knowledge and awareness of the community about GCED and the circular economy, as well as encouraging their participation in implementing sustainable practices in their communities.

Forum Group Discussion (FGD)

The Forum Group Discussion was conducted with a moderator from the community service team leading it. The Focus Group Discussion (FGD) was conducted to address environmental issues, particularly the waste problem in Sukodermo Village and Kertosari Village. The FGD began with the moderator reading out the issues to the participants. Subsequently, the participants were invited individually to express their opinions regarding the problems presented by the moderator. This aims to identify issues from various perspectives, including the village-owned enterprises (BUMDES), neighborhood heads (RT), government, and residents. After this session, the participants of the FGD are invited to respond to each other and discuss to find solutions. The community service team also presents the data collected earlier as a basis for finding solutions. The community service team reported that 41.4% of the waste generated consists of food scraps. This necessitates efforts to process waste, especially food waste, at home, as taking it to the disposal site will only produce residue. This data is also accompanied by information on the average waste of village residents. Based on data obtained from the survey using Google Forms, the average waste generated by households is between 1 and 1.5 kg per day, according to previous surveys conducted.

In addition to presenting the data, the community service team also provided references for solutions from various villages to be adopted and implemented in partner villages. At the end of the discussion, the community service team concluded the appropriate solution based on the systematically organized framework for the village community. This discussion aims to create an excellent circular economy. The discussion participants agreed to improve the services provided by the waste management team to attract more customers to the waste management service. The second solution is the establishment of a waste bank that can offer fixed prices for the waste generated by the community so that village residents provide not only residual waste but also recyclable waste that can be turned into products with high market value, especially inorganic waste, to the waste management group. Thirdly, for organic waste, the community service team invites residents to collectively implement the materials and demonstrations provided regarding various circular economy practices that each household can easily apply. Finally, the village-owned enterprises (BUMDES) will participate in the success of circular economy practices by marketing circular economy products.

Implementation

At this program's implementation stage, the Kertosari Village community applies two main approaches: implementing a circular economy through worm farming and managing used cooking oil waste banks.

Implementation of Circular Economy through Worm Cultivation

The first implementation focuses on worm cultivation as part of the circular economy. This process begins with providing 10 kg of worm seeds to two villagers who work as cattle farmers. The hope is that the cow manure produced can be utilized as feed for worms, which will then be mixed with household organic waste. Culturing these worms aims to create a sustainable cycle of utilizing organic waste. Initially, worthless waste was processed into economically valuable products through natural processes. This implementation is also expected to provide additional income for the community and raise awareness about the importance of waste management in daily life.

Implementation of Used Cooking Oil Waste Bank

In addition to worm farming, the implementation of a circular economy is also applied through the management of a used cooking oil waste bank by PKK mothers. In this program, used cooking oil generated from household activities is collected regularly. This cooking oil is then sold to a factory that exports used cooking oil for Rp 10,000 per bottle. Not only stopping there, the PKK mothers have also begun to develop aromatherapy candle products as part of the implementation of a circular economy. A total of 20

aromatherapy candle products have been successfully created and are ready to be resold, which is expected to become an additional source of income for families.

The implementation of this program is also linked to the concept of Global Citizenship Education, which aims to foster community awareness as part of the global citizenry that cares about global issues. Implementing a circular economy in Kertosari Village is one form of global action that addresses global challenges, such as waste management and environmental sustainability. The session on circular economy and Global Citizenship Education was delivered through a presentation to the community, aimed at providing a deep understanding of their role in maintaining environmental sustainability and how they can positively contribute to global issues. With this implementation, the people of Kertosari Village will become more concerned about the environment and be able to apply the concept of circular economy in their daily lives.

However, during the implementation, several challenges were encountered. One significant challenge was the community's need for more awareness and knowledge about circular economy practices, particularly worm farming and waste management. To address this, the program team increased the frequency of educational sessions, simplifying complex concepts using visual aids and demonstrations. Another challenge was resistance to change, as some villagers needed to be more open to adopting new practices. The team overcame this by emphasizing the economic and environmental benefits of worm farming and waste recycling through real-life case studies, demonstrating the potential for additional income.

Infrastructure limitations also posed difficulties, as the village needed more resources to fully support worm farming and the waste oil bank. To resolve this, the team collaborated with local stakeholders to secure essential equipment and explored cost-effective methods for managing waste. In addition, regulatory hurdles related to the waste oil bank and the sale of products like aromatherapy candles complicated the process. The program team worked closely with local authorities to ensure legal compliance and sought advice where needed. Lastly, coordination between stakeholders sometimes causes delays. Regular meetings and more explicit role assignments helped to mitigate this issue, ensuring smoother communication and more effective execution of the program. By addressing these challenges with strategic solutions and fostering greater community involvement, the circular economy program in Kertosari Village was able to progress successfully and achieve its goals.

Monitoring and Evaluation

Monitoring and evaluation are carried out through direct observation conducted periodically by the community service team. The results indicate that the community can implement the circular economy gradually and effectively. Several notes ensure that all Sukodermo Village and Kertosari Village residents can implement the circular economy. This was obtained from gathering feedback from the community through Google Forms and discussions together. The results of the monitoring and evaluation will be used for program improvements in the future.

CONCLUSION

The community service activities carried out in Sukodermo Village and Kertosari Village successfully provided the community with the tools to assess information and understand various perspectives on global issues, thereby creating a positive impact and achieving the goals of the implemented program. Through the development and implementation of Global Citizenship Education (GCED), the communities of Sukodermo Village and Kertosari Village can begin to adopt a clean and healthy lifestyle by managing waste using the concept of a circular economy to strengthen public awareness of global issues, primarily environmental issues. The enthusiasm and participation of the communities in Sukodermo and Kertosari

villages can serve as an excellent example for other villages, hoping to empower the community to promote better village development and become a sustainable program.

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