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Participatory School-Based Engagement for Sustainable Packaging Practices Among Young People: A Community Service Program in an Islamic Boarding School

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ABSTRACT

Background: The widespread use of single-use packaging among adolescents has increased environmental concerns, highlighting the need to strengthen environmental literacy and promote sustainable consumption. However, students' understanding of environmentally friendly packaging and its role in reducing plastic waste remains limited.

Purpose of the Study: This community service program aimed to examine how participatory school-based engagement could support sustainable packaging practices among female students of MA Unggulan KH Wahab Chasbullah Tambakberas, Jombang. The program focused on strengthening students' knowledge, environmental awareness, attitudes, and environmentally friendly behavior.

Methods: This community service program employed a Participatory Action Research (PAR) approach in which an interactive workshop served as one technique within the PAR cycle. Thirty-seven female students at MA Unggulan KH Wahab Chasbullah Tambakberas, Jombang, participated as active partners in identifying packaging-related issues, engaging in interactive learning sessions, practicing packaging identification, and taking part in joint reflection with school staff. The program followed PAR stages of planning, action, observation, and reflection. Outcomes were examined using a one-group pre-test–post-test design analyzed with descriptive statistics and paired-samples t-tests.

Results: The workshop successfully enhanced students' environmental packaging literacy by improving their knowledge, awareness, attitudes, and environmentally responsible behavior. Participants developed a better understanding of sustainable packaging, became more aware of the environmental impacts of plastic waste, and showed greater commitment to choosing environmentally friendly packaging and adopting sustainable consumption practices. The findings demonstrate that environmental packaging literacy workshops provide an effective educational strategy for fostering pro-environmental behavior and can serve as a practical model for integrating sustainability education into school-based community engagement programs.

Keywords
Eco-friendly; environmental packaging; environmental knowledge; environmental awareness; responsible behavior

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Introduction

Various studies and reports show that food and beverage packaging contributes a substantial portion of urban solid waste generation. In the United States, containers and packaging accounted for 28.1% of total municipal solid waste generation in 2018, and food packaging represents a major component of packaging waste (Marsh & Bugusu, 2007; U.S. Environmental Protection Agency [EPA], 2017). In Indonesia, single-use plastic packaging is a prominent component of plastic pollution: an assessment of plastic waste in Jakarta Bay found that packaging, plastic bags, styrofoam, and bottles dominated the waste stream, while single-use plastics and plastic bags were identified as major contributors to the bay's waste-management burden (Cordova et al., 2021). These conditions underscore the need to strengthen eco-friendly packaging literacy among female students as part of efforts to reduce packaging waste in daily consumption.

At MA Unggulan KH Wahab Khasbullah Tambak Beras, Jombang, these dynamics are visible in students' daily consumption practices. School records for the 2026 academic year show a total of 632 students (277 male and 355 female) who reside in the pesantren and attend classes daily. Initial observations and informal interviews with the school principal and vice principal for administration indicated that many students regularly purchase food and drinks in single-use plastic packaging (e.g., plastic bottles, cups, wrappers) at least two to three times per day, while the use of separate waste bins for recyclable and non-recyclable materials is not yet optimal. Although no formal waste audit was conducted, these patterns suggest a substantial potential for packaging waste; for example, if each student uses an average of two single-use plastic items per day, this would correspond to roughly 1,264 pieces of plastic packaging waste daily, or more than 37,000 pieces over 30 days. At the same time, interviews revealed that students' motivation for environmentally friendly behavior remains general (e.g., desire for a clean environment) and is not yet strongly linked to specific awareness and practices related to eco-friendly packaging choices. These local conditions highlight the need to strengthen eco-friendly packaging literacy among students as a strategic entry point for reducing packaging waste and promoting sustainable consumption in the school and pesantren.

Importantly, the need for this intervention reflects not only school leaders' concerns but also students' own experiences and perceived barriers. Pre-test responses indicated that many students frequently purchase food and drinks in single-use packaging during school hours, citing convenience, affordability, and limited access to reusable containers as key reasons for their choices. Behavior and attitude items further showed that, although students generally expressed concern for environmental cleanliness, this concern was not consistently translated into specific intentions to reduce single-use packaging or to choose more sustainable packaging options. During interactive discussions and reflection sessions, students highlighted additional barriers, such as the perceived practicality of disposable packaging, limited availability of refill stations, and peer norms that normalize single-use packaging. These findings suggest that the gap between general environmental concern and specific eco-friendly packaging practices is shaped by both knowledge gaps and contextual factors. Strengthening eco-friendly packaging literacy at MA Unggulan KH Wahab Khasbullah Tambak Beras therefore addresses a need that is recognized by both school stakeholders and students themselves, and seeks to support students in translating their environmental concern into more concrete, contextually grounded consumption practices. The literature shows that environmental awareness significantly influences sustainable consumption and green behavior among college students and young learners (Fadia et al., 2025; Zelezny & Schultz, 2000; Afsar et al., 2016). Additionally, research on sustainability labels on packaging shows that young people are quite responsive to environmental information, even though trust and understanding of the labels remain important factors (De Boer, 2003; Silas Souza et al., 2025; Rossi & Rivetti, 2020).

Based on initial observations and informal interviews with the Principal Faizun, M.Pd., and the Vice Principal for Administration, Mr. Randi Setiawan, it was identified that the female

students at Bahrul Ulum Tambak Beras Jombang Islamic Boarding School still tend to use single-use packaging in their daily activities, especially when it comes to food and drink consumption. This situation shows that environmentally friendly behavior, particularly in choosing and using eco-friendly packaging, has not fully become a habit in the students' daily lives.

First, from a sociodemographic perspective, female students are in their teenage years, a stage when knowledge, attitudes, and behavioral habits are still developing. At this stage, students readily accept new information. However, they are also heavily influenced by their surroundings, peers, and a culture of convenient consumption that relies on single-use packaging. This sociodemographic condition is important because it underscores that educational interventions in the pesantren have a significant opportunity to shape new, more environmentally friendly behaviors. Based on initial interviews, the motivation for female students' environmentally friendly behavior remains quite general, such as a desire for a clean, comfortable, and tidy environment. However, it has not been strongly directed towards a specific awareness of eco-friendly packaging. In other words, knowledge, attitudes, and ecological awareness are not fully connected to concrete actions in choosing more sustainable packaging.

Second, students' motivation to behave in an environmentally friendly way is not yet fully directed towards a specific awareness of eco-friendly packaging, but remains limited to a general desire to keep the environment clean. Therefore, it is necessary to strengthen literacy on eco-friendly packaging through training, discussions, and guidance that emphasize reducing single-use packaging, reusing, and sorting waste.

Third, there is still a need to increase students' knowledge, attitudes, and awareness to reduce the use of single-use packaging through systematic, practical education. The need to improve students' knowledge, attitudes, and awareness of the impact of single-use packaging on the environment arises because many students do not yet understand that simple habits, such as choosing products with single-use plastic packaging, contribute to waste generation and lower environmental quality. Because of that, we need to strengthen awareness of eco-friendly packaging through training, discussions, and guidance focused on reducing single-use packaging, reusing, and sorting waste.

The fourth important issue is the need to understand the difference in students' eco-friendly behavior before and after the training. Before the training, using eco-friendly packaging was not yet a habit; after the training, we expect improvements in pro-environmental behavior, such as reduced use of single-use packaging, greater willingness to bring reusable containers, and increased awareness of choosing more eco-friendly products.

From the description above, the problems can be identified and formulated as follows:

1. What is the profile of the sociodemographic conditions and the behavior of female students at Pesantren Bahrul Ulum Tambak Beras Jombang regarding the use of eco-friendly packaging?
2. What is the motivation of female students at Pesantren Bahrul Ulum Tambak Beras Jombang in developing environmentally friendly behavior through strengthening knowledge, attitudes, and awareness in daily life?
3. What efforts can be made to improve the knowledge, attitudes, and awareness of female students in using eco-friendly packaging by reducing the use of single-use packaging?
4. What are the differences in the environmentally friendly behavior of students in using eco-friendly packaging before and after participating in training?

The goals of this community service are:

1. To build an understanding of the sociodemographic conditions and behaviors regarding the use of eco-friendly packaging among female students at Pesantren Bahrul Ulum Tambak Beras, Jombang.

2. To understand the motivation of these female students to develop environmentally friendly behavior by strengthening knowledge, attitudes, and awareness in daily life.
3. To improve the knowledge, attitudes, and awareness of female students regarding the use of eco-friendly packaging by reducing single-use packaging.
4. To understand the differences in environmentally friendly behavior of students in using eco-friendly packaging before and after participating in the training.

The target of the activity is students at MA Unggulan KH Wahab Khasbullah Tambak Beras, Jombang, especially those interested in environmental issues. They were chosen because the teenage group is a strategic phase for forming sustainable consumption habits.For students, this activity provides benefits such as increased practical knowledge of eco-friendly packaging and smarter consumption habits. For schools, this activity helps strengthen a culture of environmental awareness in learning and school life. For the wider community, this activity is expected to produce a younger generation that is more aware of packaging's impact and better prepared to be responsible consumers.

Method

This community service activity was carried out at MA Unggulan KH Wahab Chasbullah Tambakberas Jombang as an effort to strengthen eco-friendly packaging literacy among the younger generation. The program aims to increase students' knowledge, awareness, attitudes, and eco-friendly behaviors regarding the choice and use of more sustainable packaging in everyday life. The activity is carried out through a participatory approach that emphasizes active involvement of participants in the learning process, discussions, practice, and reflection.

The method used in this activity is Participatory Action Research (PAR), a participatory approach that positions participants as active subjects in the process of change (Kemmis & McTaggart, 2005). This method was chosen because changing environmentally friendly behavior isn't achieved simply by providing information; it also requires direct involvement, real experiences, and habituation (Reason & Bradbury, 2008). In this context, PAR is used to understand students' initial conditions, identify issues in packaging consumption behavior, design improvement actions, implement educational interventions, and collectively reflect on the results.

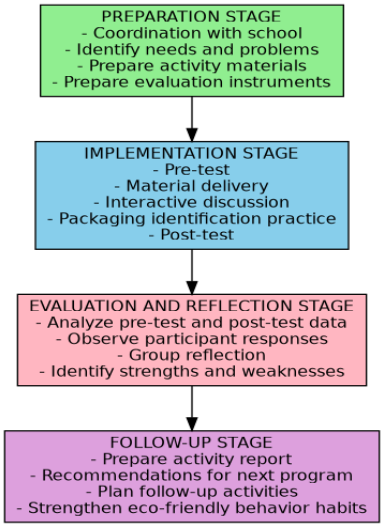


Figure 1. Flowchart of Community Service Stages

The subjects of this service activity are students at MA Unggulan KH Wahab Chasbullah Tambakberas, Jombang, especially those interested in environmental issues. The selection of students as subjects is based on the understanding that teenagers are at a strategic stage in forming sustainable consumption habits. At this stage, students tend to accept new information readily but

remain strongly influenced by their environment, peers, and a practical consumption culture that relies on single-use packaging. A total of 37 female students were chosen as subjects for this service activity.

The activity took place at MA Unggulan KH Wahab Chasbullah, located in Tambakberas, Jombang, East Java. This location was selected because initial observations and informal interviews with the school principal and vice principal for administrative affairs indicated that students frequently use single-use packaging in their daily activities, particularly for food and drink consumption within the school and pesantren environment. These institutional perspectives were complemented by informal dialogues with a group of female students and by responses to the pre-test questionnaire, in which many participants reported regularly purchasing bottled drinks and snacks in plastic wrappers and identified convenience, affordability, and limited access to reusable containers as key factors influencing their choices. Together, these sources of evidence suggest that eco-friendly behavior, particularly in choosing and using environmentally friendly packaging, has not yet fully become a habit in students' daily lives, and that there is a recognized need—both from the school and from students themselves—to strengthen literacy and practical strategies for more sustainable packaging practices..

As part of the PAR approach, this activity involves the active participation of the target community (in this case, students and school staff) in planning and organizing activities. The initial stage begins with coordination with the school, including the Principal and Vice Principal for Administrative Affairs, to identify needs and issues related to the use of environmentally friendly packaging within the school.

In addition, an initial observation and informal interviews with the school were conducted to understand the on-the-ground conditions, including students' consumption habits, the availability of supporting facilities (such as separate trash bins), and the potential to implement sustainability programs at the school. The results of this identification are then used as a basis to design activities that fit the needs and characteristics of the participants.

The involvement of the target community is also evident during the implementation stage, where students are not just recipients of information but also actively participate in discussions, packaging-identification exercises, and joint reflections. This aligns with the principle of PAR, which emphasizes that sustainable change can only be achieved when the community is actively involved in the entire change process (Kemmis et al., 2014).

Operationally, the implementation of activities follows the stages of the PAR cycle: planning, action, observation, and reflection (Kemmis et al., 2014).

1. Planning. The planning stage involves identifying the actual conditions in the MA Unggulan KH Wahab Chasbullah Tambakberas Jombang environment, particularly regarding the use of single-use packaging, students' understanding of eco-friendly packaging, and the potential to adopt sustainable consumption behaviors in the school environment. At this stage, coordination with the school is also undertaken to determine activity needs, prepare training materials, set up evaluation instruments, and design guidance forms that suit the participants' characteristics. Identifying participants' needs and initial conditions is an important step to ensure that the interventions designed are relevant to the local context and can address the problems faced (Stringer, 2014).
2. Action. The action stage is carried out through educational activities, interactive discussions, and training on eco-friendly packaging literacy. The material provided includes an introduction to types of eco-friendly packaging, the impact of single-use packaging on the environment, the principles of reduce, reuse, and recycle, and the importance of choosing products with more sustainable packaging. In addition to delivering the material, participants are guided through simple practices such as identifying examples of eco-friendly packaging, distinguishing recyclable packaging, and discussing alternative, more environmentally friendly consumption behaviors. A learning approach that combines material delivery, interactive discussions, case

studies, and hands-on practice has proven more effective at increasing participant engagement than lecture-only methods (Kolb, 1984).

3. Observation. The observation stage is conducted during the activity to assess students' responses, participation, enthusiasm, and understanding of the material presented. This observation aims to assess how well participants can grasp information, relate the material to their daily habits, and demonstrate changes in their initial attitudes towards using eco-friendly packaging. At this stage, data is also collected through pre-tests and post-tests to measure changes in participants' knowledge and behavior before and after the activity. Measuring before and after the intervention is a common method in behavioral research for evaluating the effectiveness of educational programs (Creswell, 2014).
4. Reflection. The reflection stage is carried out after all activities have been completed. At this stage, the implementation team, together with the school, evaluates the results of the activities, identifies the strengths and weaknesses of the program implementation, and formulates the necessary follow-up actions. This reflection is important for understanding the effectiveness of the methods used. Also, it serves as a basis for improvements to future service programs, making behavioral change impacts more sustainable (Kemmis et al., 2014). The joint reflection process allows participants and facilitators to learn from experience, identify strategies that worked, and plan improvement steps for the future (Stringer, 2014).

In addition to PAR, this activity is supported by an experiential learning approach, which is learning based on direct experience (Kolb, 1984). This approach is chosen because students find it easier to understand the material when they not only receive theoretical explanations but also engage in practical activities that connect knowledge to everyday experiences. This way, the learning process becomes more contextual, interactive, and meaningful.

Overall, this community service activity is designed to gradually build awareness, knowledge, and eco-friendly behavior through a participatory process. By combining planning, action, observation, and reflection, this activity is expected to create changes that are not just temporary, but also serve as the start of developing more sustainable consumption habits in schools and pesantren.

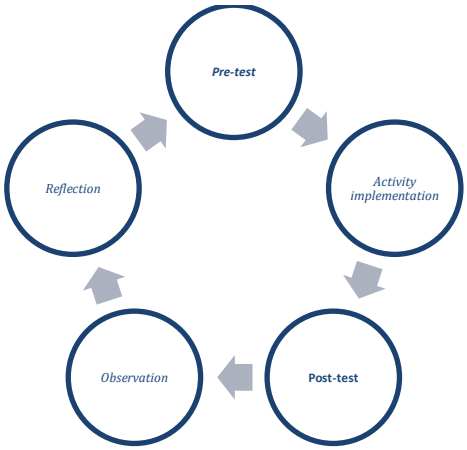


Figure 2. Implementation of activities the PAR cycle

The instruments used in this activity include: a pre-test and post-test questionnaire, which are used to measure changes in students' knowledge, awareness, attitudes, and eco-friendly behavior before and after participating in the activity. These instruments were developed based on indicators of environmental literacy and sustainable consumption behavior (Fadia et al., 2025; Fakhrudin et al., 2022).

Measuring before and after an intervention is a common method in behavioral research for evaluating the effectiveness of educational programs (Creswell, 2014). In the context of eco-friendly behavior, the literature shows that environmental awareness has a positive and significant

influence on Generation Z's purchasing decisions for eco-labeled products (Fakhrudin et al., 2022).

The strategy used in this activity is an interactive and participatory learning approach that combines the delivery of material, interactive discussions, case studies, and hands-on practice. This approach was chosen because research shows that experiential learning has a greater impact on behavior change compared to lecture-only methods (Kolb, 1984).

The methods used include:

1. Delivering material, which involves providing information about environmentally friendly packaging literacy through interactive presentations.
2. Interactive discussions, which are Q&A sessions and group discussions to delve deeper into the material and connect it with daily experiences.
3. Packaging identification practice, which is a hands-on activity to recognize types of environmentally friendly packaging and distinguish recyclable packaging.
4. Joint reflection, which is an evaluation and reflection session to identify the lessons learned and plan.

The data obtained from the pre-test and post-test questionnaires were analyzed using descriptive statistics and a paired-samples t-test. Descriptive statistics were used to characterize the distribution of students' knowledge, awareness, attitudes, and environmentally friendly behaviors before and after the activities. Meanwhile, the paired sample t-test was used to determine whether there was a significant difference between the conditions before and after the activities. This analysis was conducted using statistical software, and the test results were considered significant if the p-value was < 0.05. This analysis aligns with Creswell's (2014) recommendations for using a pre-test and post-test design to evaluate intervention effectiveness.

Result

Activity Implementation

The eco-friendly packaging literacy program was organized and implemented through an interactive workshop that was co-planned with school stakeholders at MA Unggulan KH Wahab Chasbullah, Tambakberas, Jombang. During planning, the implementation team worked with the school principal, vice principal for administrative affairs, and several teachers to identify needs related to packaging consumption, determine the target group, and shape the workshop agenda. Based on these joint discussions, 37 female students who expressed interest in environmental issues were invited to participate as active partners in the program. The focus on female students was informed by the understanding that adolescence is a strategic period for shaping sustainable consumption habits, and that students at this stage are both receptive to new information and strongly influenced by their peers and everyday consumption culture.

Rather than being passive recipients of a pre-designed intervention, the students participated in a process that combined interactive learning with opportunities to voice their experiences and priorities. At the beginning of the workshop, participants shared their everyday packaging consumption practices, the types of food and drinks they commonly purchase at school, and the challenges they face in adopting more eco-friendly options (such as limited access to reusable containers, perceptions of convenience, and peer influence). These inputs were used to adjust the emphasis of the session, prioritize practical strategies for reducing single-use packaging, and ensure that case studies and group discussions reflected situations that students encounter in the canteen, dormitories, and daily pesantren life.

Throughout the workshop, students engaged in interactive lectures, group discussions, hands-on identification of packaging types and eco-labels, and joint reflection on how their consumption choices affect the school and wider environment. School staff supported the process by facilitating logistics, encouraging student participation, and discussing potential follow-up

actions, such as promoting reusable containers and strengthening waste segregation practices within the school. In this way, the activity was not simply "conducted" on the students, but organized with them and with school stakeholders as partners in a shared effort to build more sustainable packaging practices in the school and pesantren community.

From a sociodemographic perspective, students are in their teenage years, which, developmentally, are still in the phase of forming knowledge, attitudes, and behavioral habits. At this stage, students readily accept new information. However, they are still heavily influenced by their environment, peers, and a practical consumption culture that relies on single-use packaging. This sociodemographic context is important because it underpins the idea that educational interventions in schools are well-positioned to shape new, more environmentally friendly behaviors.

Table 1. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Knowledge pretest	37	6.00	9.00	7.4865	.76817
Environmental Awareness pretest	37	2.00	3.53	2.7689	.34987
Attitude pretest	37	2.87	3.87	3.3903	.32006
Environmentally Friendly Behavior pretest	37	2.30	5.00	3.8027	.75479
Knowledge1 postest	37	8.00	10.00	8.8649	.48087
Environmental Awareness1 postest	37	2.75	4.00	3.6824	.34181
Attitude1 postest	37	2.80	4.00	3.6270	.38919
Environmentally Friendly Behavior1 postes	37	3.00	5.00	4.1649	.51812
Valid N (listwise)					

Moreover, these results reinforce the idea that schools are strategic agents of change in shaping a culture of sustainable consumption. By strengthening literacy on eco-friendly packaging from a young age, students are expected to become more critical, responsible consumers who care about the environmental impact of every consumption decision they make.

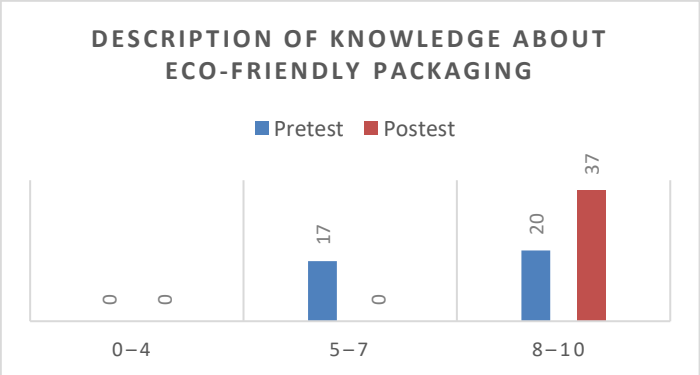


Figure 3. Description of Knowledge about eco-friendly packaging

The Figure 3 shows changes in students' knowledge of eco-friendly packaging before and after the workshop. Knowledge levels are grouped into three categories: low (scores 0–4), medium (scores 5–7), and high (scores 8–10).

The pre-test results showed that no students (0%) were in the low knowledge category (0–4). Seventeen students (45.95%) were in the medium category (5–7), while 20 students (54.05%) were already in the high category (8–10). This indicates that before attending the workshop, most students already had a basic understanding of environmental issues and eco-friendly packaging.

However, almost half of the participants were still in the medium knowledge category.

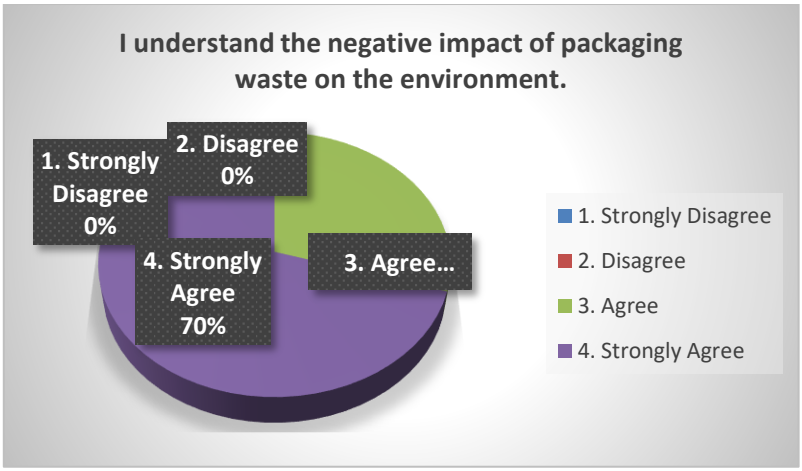


Figure 4. Description of environmental awareness about eco-friendly packaging

The image above shows the level of participant agreement with the statement that they understand the negative environmental impact of packaging waste after attending the eco-friendly packaging literacy workshop. The results show that 70% of participants strongly agreed, while 30% agreed. No participants chose the disagree or strongly disagree categories (0%).

This distribution of responses shows that all participants (100%) recognize the importance of understanding the environmental impact of packaging waste. The dominance of 'strongly agree' responses indicates that the workshop material successfully raised participants' awareness of the link between single-use packaging and various environmental problems, such as soil and water pollution, plastic waste accumulation, and increased carbon emissions from packaging waste management.

The workshop activities were associated with notable changes in students' knowledge and environmental awareness related to eco-friendly packaging. Before the workshop, no students (0%) were in the low knowledge category (scores 0–4). Seventeen students (45.95%) were in the medium category (scores 5–7), while 20 students (54.05%) were already in the high category (scores 8–10). After attending the workshop, all 37 students (100%) were in the high knowledge category (8–10), and none remained in the medium or low categories. This shift in distribution indicates that all participants achieved higher scores on the knowledge test following the workshop.

In terms of environmental awareness, participants responded to a statement regarding their understanding of the negative environmental impact of packaging waste. The results show that 70% of participants strongly agreed, while 30% agreed with this statement after the workshop. No participants chose the disagree or strongly disagree categories. This distribution of responses indicates that all participants recognized the importance of understanding the environmental impact of packaging waste, with a majority expressing a strong level of agreement.

During the workshop, students actively participated in interactive lectures, group discussions, hands-on identification of packaging types and eco-labels, and joint reflection sessions. Observations of participant engagement indicated high levels of enthusiasm, frequent contributions during discussions, and active involvement in practical activities such as distinguishing recyclable packaging and discussing alternative consumption behaviors. These workshop dynamics, combined with the observed shifts in knowledge categories and awareness responses, suggest that the program was associated with increased understanding of eco-friendly packaging and greater recognition of the link between packaging choices and environmental impacts among the participants.

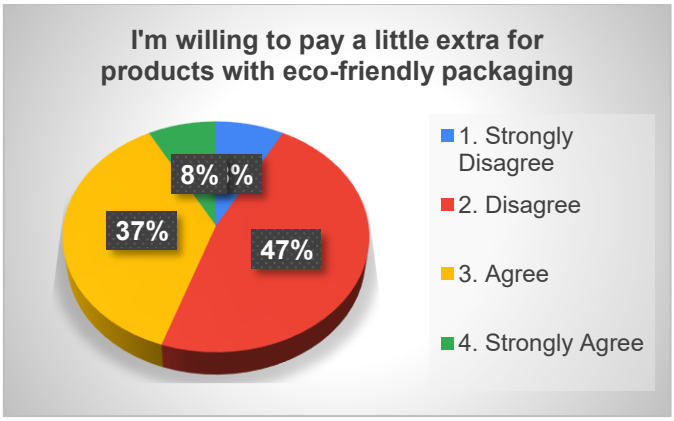


Figure 5. Description of attitude about eco-friendly packaging

The pre-test results showed that students' willingness to reduce single-use plastic remained relatively low. About 16% of respondents strongly disagreed, and 32% disagreed, so overall 48% were not yet willing to reduce their use of single-use plastic. On the other hand, 47% of respondents agreed, and only 5% strongly agreed, making a total of 52% of respondents showing readiness to cut down on single-use plastic.

The distribution of these responses shows that before participating in the workshop, there were two relatively balanced groups. Some students already had an initial awareness of reducing single-use plastic, but almost half still hadn't shown readiness to change their consumption habits. This indicates that single-use plastic is still seen as a practical and easily accessible choice.

Problem-Solving Realization

The results obtained from the research must be supported by sufficient data. This section should describe the outcomes of the community service process, detailing the dynamics of the assistance activities, such as the variety of actions undertaken, the forms of technical or program interventions aimed

Table 2: Paired Sample t-test

	Pre-test (Mean)	Post-test (Mean)	Improvement	t-value	p-value
Knowledge	7,49	8,86	+1,38	-13,120	<0,001
Environmental Awareness	2,77	3,68	+0,91	-10,494	<0,001
Attitude	3,39	3,63	+0,24	-2,852	0,007
Eco Friendly Behavior	3,80	4,16	+0,36	-7,058	<0,001
Valid N (listwise)					

Analysis of Pre-test and Post-test Results

To assess the effectiveness of the workshop "Strengthening Literacy on Environmentally Friendly Packaging as an Effort to Build Awareness and Eco-Friendly Behavior in Young People Towards Sustainable Consumption," measurements were conducted before (pre-test) and after (post-test) the activity among 37 female students, using a Paired Sample t-test. This analysis aims to find out whether there were significant changes after the participants received the material, discussions, case studies, and practice in recognizing environmentally friendly packaging.

1. ***Increase in Knowledge***

The analysis results show that the average knowledge score increased from 7.49 in the pre-test to 8.86 in the post-test, a rise of 1.38 points. The t-test results yielded a t-value of -13.120 with

$p = 0.000$ ($p < 0.001$), indicating a highly significant difference between before and after the workshop.

This improvement shows that the workshop materials successfully enhanced participants' understanding of: the characteristics of eco-friendly packaging; types of packaging materials that can be recycled; the environmental impact of single-use plastics; and the principles of reduce, reuse, recycle in packaging use.

The magnitude of the score increase indicates that knowledge is the component easiest to improve through educational interventions in a relatively short time. This section should describe the outcomes of the community service process, detailing the dynamics of the assistance activities, such as the variety of actions undertaken, the forms of technical or program interventions aimed.

2. ***Increased Environmental Awareness***

The average environmental awareness score increased from 2.77 to 3.68, with a rise of 0.91 points. The statistical test results showed $t = -10.494$ with $p = 0.000$, indicating that the change is statistically significant. These findings suggest that after attending the workshop, participants became more aware that the packaging choices they make every day affect environmental pollution. Participants began to understand that simple actions, such as bringing a reusable tumbler, using their own food containers, and choosing products with eco-friendly packaging, are real ways to help reduce plastic waste. This increase in awareness is significant because, according to various environmental behavior theories, awareness is a prerequisite for forming environmentally friendly intentions and behaviors.

3. ***Change in Attitude Towards Eco-Friendly Packaging***

The average attitude score increased from 3.39 to 3.63, with a difference of 0.24 points. Although the increase wasn't as large as for other variables, the test results showed $t = -2.852$ with $p = 0.007$, indicating the change was significant. This finding indicates that the workshop not only expanded participants' knowledge but also began to shape a positive attitude towards using eco-friendly packaging. Attitude is a psychological aspect that is relatively more stable than knowledge, so it usually takes longer to see big changes. Therefore, the attitude change that happened after just one workshop can be seen as a good result and serves as a foundation for building more sustainable behavior through continued guidance.

4. ***Increase in Eco-Friendly Behavior***

The average score on the environmentally friendly behavior scale increased from 3.80 in the pre-test to 4.16 in the post-test, a 0.36-point increase. Statistical tests showed $t = -7.058$ with $p = 0.000$, indicating a significant difference between conditions before and after the activity. The behavior scale included items related to participants' self-reported practices and intentions, such as their tendency to choose products with more eco-friendly packaging, reduce the use of single-use plastics, use reusable containers, and pay more attention to environmental symbols or labels on product packaging.

It is important to note that these scores reflect immediate changes in self-reported behavior-related intentions and perceived practices following the workshop, rather than directly measured, sustained behavioral change over time. In other words, the increase in the behavior score represents an output of the educational intervention (i.e., greater readiness and intention to act in more eco-friendly ways), not yet a confirmed long-term outcome in terms of actual reductions in single-use packaging consumption or waste generation in the school and pesantren environment.

Within this understanding, the observed increase suggests that, after the workshop, participants reported a higher tendency to engage in more eco-friendly packaging-related practices. However, translating these reported tendencies into sustained habits and broader social change will require additional supportive conditions, such as continued reinforcement through school

routines, availability of reusable containers, clear waste segregation infrastructure, and ongoing peer and teacher support. These aspects are discussed further in the Discussion and Recommendations sections, where planned mechanisms for sustained habituation and follow-up actions are outlined

Even though the behavior change isn't as big as the increase in knowledge, these results show that the process of behavior change has started to take shape.attitude change that happened after just one workshop can be seen as a good result and serves as a foundation for building more sustainable behavior through continued guidance.

Discussion

Overall, the results of this community service activity show that the workshop on eco-friendly packaging literacy had a positive impact on all measured dimensions. Knowledge about eco-friendly packaging increased the most, followed by environmental awareness, eco-friendly behavior, and attitudes. Knowledge increased the most, with the average score rising from 7.49 to 8.86. This indicates that delivering material on types of eco-friendly packaging, the environmental impact of packaging waste, the principles of reduce, reuse, and recycle (3R), and introducing eco-labels significantly enhanced participants' understanding. This finding aligns with recent studies on environmental literacy and sustainability education, which emphasize that knowledge about environmental issues is an important foundation for building awareness and enabling more responsible consumption practices, especially among young people (Perea et al., 2025; Nguyen et al., 2025). Research in school-based environmental education also shows that structured learning activities can significantly improve students' understanding of sustainability issues and their willingness to adopt more environmentally friendly behaviors (Norton & Lignou, 2024; Ramadhanti et al., 2024).

Besides knowledge, environmental awareness also increased significantly, from an average of 2.77 to 3.68. This result indicates that participants are beginning to understand the connection between everyday consumption behavior and environmental issues, particularly the impact of single-use packaging on rising plastic waste. This awareness becomes an important asset in developing more responsible consumption behavior. This finding supports Siregar's (2022) research, which shows that the more environmentally aware young people are, the more likely they are to adopt sustainable consumption and eco-friendly behavior. Similarly, Zelezny and Schultz (2000) explained that environmental awareness is a key determinant of pro-environmental behavior because it can increase an individual's concern about the ecological consequences of their actions.

In terms of attitude, scores increased from 3.39 to 3.63, although the increase was relatively smaller than for the other variables. This is common in behavioral research because attitudes are relatively stable psychological constructs shaped by past experiences, values, and habits. According to Ajzen (1991), the Theory of Planned Behavior suggests that changing attitudes requires gradual internalization before forming intentions and behaviors. Therefore, even a relatively small but significant increase in attitude suggests the workshop has begun to shift participants' orientation toward the importance of choosing more environmentally friendly packaging.

Meanwhile, eco-friendly behavior increased from 3.80 to 4.16, indicating that participants are increasingly likely to adopt sustainable behaviors, such as bringing their own water bottles, using reusable containers, reducing single-use plastic, and paying closer attention to environmental information on product packaging. These findings reinforce Perea et al.'s (2025) research, which found that increased knowledge and environmental awareness encourage the development of real eco-friendly behavior. In addition, Putri (2023) shows that understanding green packaging and eco-labels can strengthen young people's positive perceptions of sustainable products, influencing their consumption decisions.

The sequence of improvements in the results of this research-based community service illustrates the process of behavior change as explained in various environmental behavior theories. According to the Value–Belief–Norm Theory developed by Stern (2000), pro-environmental behavior change starts with increased knowledge and beliefs about environmental issues, then develops into personal norms which are eventually expressed in actual behavior. The results of this community service activity show that the workshop has successfully initiated this process and has the potential to lead to more permanent behavior changes if followed by continuous habituation and mentoring.

The results of this activity also show that a learning approach combining material delivery, interactive discussions, case studies, product packaging identification, and hands-on practice recognizing eco-labels is an effective educational strategy. According to Kolb (1984), experiential learning has a greater impact on behavior change than lecture-only methods because participants directly connect the concepts they learn with their daily experiences. Therefore, the workshop method applied in this community service activity can boost participant engagement, making the process of internalizing sustainability values more effective.

Beyond the statistical changes in knowledge, awareness, attitudes, and self-reported behavior, the workshop and its surrounding process offer insights into how accompaniment dynamics and the school's social structure influenced the observed outcomes. The program was implemented in a pesantren-based madrasah, where daily life is characterized by close interaction among students, strong routines, and a clear hierarchical structure involving the principal, vice principals, teachers, and dormitory supervisors. This social configuration created both opportunities and constraints for the engagement process.

Several features of the school's social structure appeared to facilitate change. First, there was strong institutional support from the school leadership. The principal and vice principal for administrative affairs actively participated in the initial coordination meetings, endorsed the program, and encouraged teachers to support its implementation. This top-level endorsement helped legitimize the workshop as a relevant and valued activity within the school's agenda, making it easier to mobilize participants and allocate time and space for the sessions.

Second, the pesantren environment, where students live, study, and eat in the same location, created a dense social context in which new ideas and practices can spread relatively quickly through peer interaction. During the workshop, students often referenced shared experiences, such as buying food at the same canteens, using similar packaging, and managing waste in their dormitories. This shared context allowed group discussions and reflection sessions to build on concrete, everyday situations rather than abstract environmental concepts, which likely contributed to the high levels of engagement and the shifts observed in knowledge and awareness scores.

Third, integrating moral and religious education into the school's curriculum provided a normative foundation that aligned with the program's emphasis on responsibility, care, and stewardship. In several discussions, students and teachers connected environmentally friendly behavior—such as reducing waste and choosing more sustainable packaging—to broader values of cleanliness, gratitude, and responsibility toward creation. This alignment between environmental messages and existing moral frameworks may have helped participants internalize the workshop content more readily than in contexts where such values are less explicitly articulated.

However, the accompaniment process also revealed persistent barriers that limit translating increased knowledge and intention into sustained behavioral change. One key barrier is the material and infrastructural environment. Despite students' expressed willingness to reduce single-use packaging, school canteens and nearby vendors still rely heavily on disposable plastic packaging, and reusable container options are not yet systematically promoted or supported. Separate waste bins exist in some areas but are not consistently used or clearly labeled, which reduces the visibility and practicality of waste segregation as a daily practice.

A second barrier relates to time and curricular pressures. The workshop was implemented as a one-time intensive activity within a busy school schedule. While this format allowed focused learning and reflection, it also limited time for iterative cycles of action, observation, and reflection within the PAR framework. Teachers and school leaders expressed interest in integrating environmental topics more systematically into regular lessons and extracurricular activities, but noted constraints related to curriculum demands and examination priorities. This tension highlights the challenge of embedding sustainability practices in schools where academic performance metrics remain dominant.

A third barrier concerns social norms and perceptions of convenience. During discussions, some students noted that single-use packaging is often perceived as more modern, practical, and hygienic, especially in a busy school routine. Peer influence also plays a role: when most students buy packaged drinks and snacks, opting for reusable containers can feel socially conspicuous or inconvenient. These normative and practical barriers suggest that individual knowledge and attitude changes, while important, are insufficient on their own to produce lasting behavioral change without supportive structural and cultural conditions.

Reflecting on these dynamics, the program's accompaniment process can be understood as an initial step that activated enabling conditions within the school's social structure (leadership support, dense peer networks, alignment with moral values) while also exposing structural and normative barriers that require longer-term, multi-level interventions. Future community engagement efforts in similar contexts may benefit from: (1) establishing clearer mechanisms for student leadership in sustainability (e.g., environmental clubs, student "eco-ambassadors"); (2) working with canteen operators and vendors to reduce single-use packaging and promote reusable alternatives; (3) integrating environmental practices into daily school routines and policies (e.g., waste segregation protocols, guidelines for school events); and (4) adopting a longer-term mentoring model that allows for iterative PAR cycles and continuous reflection with students, teachers, and school leaders.

The sequence follows behavior change theory, which holds that knowledge is the primary foundation for developing awareness, then evolves into a positive attitude, and finally manifests in actual behavior. In other words, behavior improvement doesn't happen instantly, but is the result of an ongoing process of internalizing knowledge and building awareness. These findings also support previous studies showing that environmental education can increase environmental awareness and encourage more sustainable consumption behavior among young people. Workshops that combine material delivery, interactive discussions, real packaging examples, and hands-on practice in identifying eco-friendly packaging have proven effective as contextual learning tools for students.

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These findings suggest that improving students' eco-friendly packaging literacy should not be treated merely as an individual responsibility. Schools can serve as key institutional settings for developing students' awareness of packaging waste, encouraging critical consumption choices, and promoting environmentally responsible behavior. By building literacy in eco-friendly packaging from a young age, students are expected to become more critical, responsible consumers who consider the environmental impact of every consumption decision.

Overall, the results show that improving literacy about eco-friendly packaging is an effective strategy for raising a younger generation more aware of the environmental impacts of their consumption. These findings also reinforce previous research, indicating that environmental education in schools is a key tool for achieving the Sustainable Development Goals (SDGs),

particularly Goal 12 (Responsible Consumption and Production) and Goal 13 (Climate Action).

Conclusion

This community service program aimed to strengthen eco-friendly packaging literacy among female students at MA Unggulan KH Wahab Chasbullah Tambakberas Jombang and to assess its effectiveness in improving knowledge, environmental awareness, attitudes, and eco-friendly behavior toward sustainable consumption. The findings show that the workshop successfully achieved these objectives by producing significant improvements across all measured dimensions, with the greatest gains appearing in knowledge, followed by environmental awareness, eco-friendly behavior, and attitudes. These results indicate that even a relatively short participatory educational intervention can initiate meaningful cognitive and behavioral change when it is designed through interactive, contextual, and experiential learning.

Theoretically, the findings reinforce the assumption that environmental behavior change begins with knowledge acquisition, develops through awareness and attitude formation, and is eventually translated into actual practice. In this sense, the results support environmental literacy perspectives, the Theory of Planned Behavior, and the Value–Belief–Norm framework, which emphasize that behavioral change is not instantaneous but emerges through gradual internalization of information, values, and norms. The workshop also shows that school-based community engagement can strategically translate environmental education into social transformation, especially among adolescents still in a formative stage of habit building and highly receptive to new knowledge and norms.

From a community service perspective, the study suggests that programs on eco-friendly packaging should move beyond one-time awareness sessions and be integrated into continuous habituation and school policy support. Practical follow-up actions are needed, such as promoting reusable containers, reducing single-use plastic in school activities, strengthening waste segregation, and establishing environmental ambassadors among students. Such measures would help sustain the changes initiated by the workshop and transform individual awareness into collective environmental culture. The involvement of schools, teachers, and pesantren stakeholders is therefore essential to ensure that the intervention becomes embedded in daily routines rather than remaining a temporary educational event.

Future community service programs should extend this work by adopting a longitudinal design to examine whether the behavioral changes persist over time. Further studies may also include additional variables such as green purchase intention, eco-label literacy, environmental self-identity, and subjective norms to obtain a more comprehensive understanding of the determinants of sustainable consumption among young people. In addition, comparative studies across different schools or pesantren contexts would be valuable to identify which institutional conditions most effectively support the long-term institutionalization of eco-friendly behavior.

Recommendations

Based on these findings, several practical recommendations can be proposed for future community service and school-based interventions. First, schools and pesantren should institutionalize eco-friendly packaging literacy through regular workshops, classroom integration, and student-led campaigns so that environmental values are reinforced beyond one-off activities. Second, environmental education programs need to be supported by concrete infrastructural and policy changes, such as providing separated waste bins, limiting single-use plastics in school events, promoting refill stations, and encouraging the daily use of reusable containers.

Third, collaborative initiatives between universities, schools, and local communities should be strengthened to co-design context-specific modules that link environmental literacy with students' everyday consumption realities. Finally, future community service projects are

encouraged to adopt a longer-term mentoring model, where periodic follow-up sessions and student environmental clubs help maintain momentum and transform initial awareness into sustained pro-environmental habits.

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Conflicts of Interest

The authors declare no conflict of interest.

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