



Student's knowledge and awareness of 3R in relation to the implementation of the P5 "Sustainable Lifestyle" theme

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Article Information	Abstract
Keyword: Level of success of P5; Sustainable lifestyle; Knowledge; Awareness; 3R concept Kata Kunci: Tingkat keberhasilan P5; Gaya hidup berkelanjutan; Pengetahuan; Kesadaran; Konsep 3R History: Received : 17/07/2025 Revised : 21/02/2026 Accepted : 26/02/2026 Published : 28/02/2026	The Strengthening Pancasila Student Profile (P5) project program is a policy within the Merdeka Curriculum aimed at developing 21st-century character and competencies through project-based learning. This study aims to evaluate the effectiveness of the implementation of the P5 project with the Sustainable Lifestyle theme on 3R-related knowledge and awareness among ninth-grade students at SMP Negeri 2 Sungai Raya. The method used was ex post facto correlational design with a quantitative descriptive approach and simple linear regression analysis. The research instruments included a knowledge test and a 3R awareness questionnaire. The results showed that the average scores for P5 implementation (74.73), knowledge (79.11), and awareness (76.74) were all categorized as 'good.' The simple regression analysis indicated that students' knowledge ($\beta = 0.448$; $p = 0.001$; $R = 0.166$) and students' awareness ($\beta = 0.097$; $p = 0.003$; $R = 0.04$) were positively influenced, with knowledge showing a more dominant effect than awareness. These findings suggest linear relationship between the implementation of the Sustainable Lifestyle-themed P5 project and the strengthening of cognitive (knowledge) and affective (awareness) aspects related to environmental issues. <i>Abstrak. Program Proyek Penguatan Profil Pelajar Pancasila (P5) merupakan kebijakan dalam Kurikulum Merdeka yang bertujuan membentuk karakter dan kompetensi abad ke-21 melalui pembelajaran berbasis proyek. Penelitian ini bertujuan mengevaluasi keberhasilan implementasi P5 tema Gaya Hidup Berkelanjutan terhadap pengetahuan dan kesadaran 3R pada siswa kelas IX di SMP Negeri 2 Sungai Raya. Desain penelitian adalah korelasi ex post-facto dengan pendekatan deskriptif kuantitatif dan uji regresi linear sederhana. Instrumen penelitian berupa tes pengetahuan dan angket kesadaran 3R. Hasil penelitian menunjukkan nilai rata-rata implementasi P5 sebesar 74,73; pengetahuan 79,11; dan kesadaran 76,74, seluruhnya dikategorikan 'baik'. Uji regresi sederhana menunjukkan bahwa pengetahuan siswa ($\beta = 0,448$; $p = 0,001$; $R = 0,166$) dan kesadaran siswa ($\beta = 0,097$; $p = 0,003$; $R = 0,04$) dengan pengaruh pengetahuan lebih dominan daripada kesadaran. Temuan ini menunjukkan ada linearitas hubungan antara implementasi P5 tema Gaya Hidup Berkelanjutan dengan penguatan aspek kognitif (pengetahuan) dan afektif (kesadaran) mengenai permasalahan lingkungan.</i>

A. Introduction

The Kurikulum Merdeka (Independent Curriculum) was introduced as a response to the need for more contextual, transformative, and student-centered education. One of the main policies under the Independent Curriculum is the Pancasila Student Profile Strengthening Project (P5), which is designed to develop students' 21st-century character and competencies through project-based learning (Firoh et al., 2025). There are seven themes of P5 program implemented in schools: (1) entrepreneurship; (2) the voice of democracy; (3) engineering and technology; (4) build body and soul; (5) global diversity; (6) local wisdom; and (7) sustainable lifestyle. The implementation of P5 in schools is flexible, meaning that it is adapted to the needs of each school (Satria et al., 2022).

Sustainable Lifestyle (GHB) is one of the main themes in P5 which aims for integrating environmental values and sustainable behaviors into students' daily lives. This theme is particularly important in addressing environmental problems such as plastic waste, organic waste, and consumerist behavior, which have become pressing issues requiring intervention through education (Nurhayati et al., 2022). Various activities are conducted by the schools to conceptualize GHB, for example reducing using the plastics, saving energy and planting trees projects (Widoesmi & Nugrahaeni, 2024), gardening (Acharya et al., 2020), ecoliteracy and sustainable economic (Imran et al., 2024). An interview with the GHB theme P5 coordinator at SMP Negeri 2 Sungai Raya, Siburian, S.Pd, revealed that in order to select and execute the P5 GHB project in his school, he need to consider the main challenges include low student understanding of the 3R (reduce, reuse, recycle) concept, limited time allocation from the school, and lack of human resources supporting the program (interview, September 4, 2024, unpublished data). This brought the school to introduce students with the GHB project of creating handicrafts by implementing Ecobrick, Ecoenzyme and Ecoprint. The three activities are conducted simultaneously within one time frame (2 months) which involve all teachers teaching about the 3R concepts in their class. By so doing, they aim to develop students' understanding and attitude of implementing 3R as part of environmental awareness in a global sense.

The environmental project-based learning models GHB theme emphasizing hands-on practice and collaboration have proven effective in promoting sustainable behavior among students, as found by Mujahidin et al. (2023) at SMP Negeri 2 Taman, Surbaningrum et al. (2025) at SMPN 5 Malang, and Dewi et al. (2023) at SMPN 15 Mataram. Similarly, Wahidah et al. (2023) also stated that school-based environmental projects can significantly increase students' awareness and engagement with environmental issues. However, most of research

conclusions previously mentioned obtained by observing students' behavior during the project or measuring their perception. It is interesting to evaluate the impact of the Sustainable Lifestyle project by correlating it with students' improvement of cognitive and affective towards the environmental issues. Since the SMP Negeri 2 Sungai Raya had conducted the specific GHB theme of 3R and had a specific goal of developing understanding and the environmental awareness of 3R, the cognitive and affective impact could be measured in a narrower scope.

The assessment process of the GHB theme P5 at SMP Negeri 2 Sungai Raya had been well documented. Students' scoring in the program follows the rubric outlined in the module developed by the school. Generally, the module serves as the basis for teachers' assessments and has been designed for systematic implementation. The assessment covers the planning, execution, and evaluation stages, based on rubrics and measurable achievement indicators with the categories: "Beginning to Develop," "Developing," "Developing as Expected," and "Highly Developed" (Satria et al., 2022). These categories are intended to help students see their own progress in the implementation of the P5 program. The evaluation results for P5 GHB theme projects are provided in report cards. Unfortunately, after the GHB program, the teacher still perceives that students' knowledge and awareness of the importance of the 3R principle have not fully grown. This is also evident from the continued behavior of littering and the lack of active participation in waste management activities (Sahabuddin et al., 2024). It is interesting to evaluate the success of the program in terms of whether they had an impact on students' understanding and attitude towards 3R and how much the program contributes to their sustainable lifestyle. A thorough evaluation of P5 activities should provide information about the effectiveness of the program in building sustainable habits aligned with the GHB theme's core purpose as part of character education under the Independent Curriculum. As stated by Prihatini and Supriyanto (2024), monitoring and evaluation are crucial steps in ensuring the achievement of goals and success indicators of the P5 program, as they help identify obstacles and determine more appropriate strategies to enhance program implementation quality.

This study aims to measure the success of P5 implementation under the GHB theme at SMP Negeri 2 Sungai Raya by examining the relationship between GHB theme implementation and students' knowledge and awareness of 3R. The data focuses on students' performance in GHB-themed P5 implementation using report card scores, while knowledge and awareness were measured through knowledge tests and awareness questionnaires. The results of this

study can serve as a reference and evaluation tool for SMP Negeri 2 Sungai Raya, particularly in assessing the effectiveness of P5 GHB implementation. The main indicators examined are based on the average P5 report card scores as a representation of project success, average test scores for cognitive understanding of 3R concepts, and average questionnaire scores for affective attitudes toward 3R among all students at SMP Negeri 2 Sungai Raya.

B. Material and method

This study employed an ex-post facto correlational design with a descriptive quantitative and simple linear regression analysis. Researcher did not persuade any intervention to the students. Data was collected within two different time frames. The cognitive test of 3R and the questionnaire survey of students' attitude of 3R was developed in the time the research is conducted. The score of completing the GHB project obtained from the scoring card of "Ecobrick, Ecoenzyme, Ecoprint" when students were introduced to the concepts of 3R last year, considered as retrospective data sample. The descriptive quantitative approach was used to objectively describe the success level of the P5 Sustainable Lifestyle (GHB) theme implementation, measure students' cognitive understanding, measure students' affective awareness, and analyze the relationship between the implementation of the GHB-themed P5 and students' knowledge and awareness regarding 3R using simple linear regression analysis. Data on the implementation of the GHB-themed P5 were collected during the odd semester of the 2023/2024 academic year (November 2023 – February 2024), coinciding with the execution of the P5 GHB theme at SMP Negeri 2 Sungai Raya.

The research sample consisted of all ninth-grade students in the odd semester of the 2024/2025 academic year at SMP Negeri 2 Sungai Raya, the same students with which previously involved in following the GHB project focusing on 3R. A total of 225 students, who completed both the test and the questionnaire. The GHB-themed P5 report card scores were obtained from the same students when they were in the eighth grade during the odd semester of the 2023/2024 academic year. The sampling technique used was total sampling, meaning that all population members were included as the research sample. There is no intervention of exposing students with 3R during the gap times, assuming that their knowledge and awareness of 3R are contributed to the GHB program conducted last year. Data collection instruments included interview guides, knowledge test questions, and 3R awareness questionnaires. The interview was conducted with the P5 GHB theme coordinator and science teachers, while the test and questionnaire were distributed to students from classes IX-A to IX-H at SMP Negeri 2 Sungai Raya.

The data collection techniques included interviews, test administration, questionnaires, and documentation. The interview instrument was used as a qualitative data collection technique aimed at the Pancasila Student Profile Strengthening Project (P5) coordinator for the Sustainable Lifestyle (GHB) theme and science teachers at SMP Negeri 2 Sungai Raya. The purpose of the interviews was to gather in-depth information related to the planning, implementation, and evaluation of the P5 GHB theme at the school, including the challenges faced and strategies used in the implementation. The test and questionnaire related to 3R aimed to assess cognitive (knowledge) and affective (attitude) aspects among all ninth-grade students at SMP Negeri 2 Sungai Raya. The test consisted of 15 multiple-choice questions focusing on the 3R concept, and the awareness questionnaire was designed using a Likert scale with four options: Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). It consisted of 16 statements (9 positive and 7 negative) focusing on environmental issues and waste management through the 3R method. The research seeks content validation. Both the test and questionnaire are validated by two experts before being used to collect data.

The success level of the GHB-themed P5 implementation for the sample students at SMP Negeri 2 Sungai Raya was measured using the average P5 report card score. There were two dimensions in the assessment of the GHB theme: collaboration and creativity. The collaboration dimension included four aspects: (1) communication to achieve common goals, (2) social coordination, (3) teamwork, and (4) positive interdependence. The creativity dimension included only one aspect: producing original work and actions. Teachers' assessments in the P5 report were qualitative using a four-level scale: Beginning to Develop (BD), Developing (D), Developing as Expected (DE), and Highly Developed (HD). To convert the data into a quantitative format for analysis, the qualitative categories were assigned numerical values: BD = 1; D = 2; DE = 3; HD = 4. The percentage of students in each category per dimension was calculated using the Formula 1. Next, the students' average scores were categorized based on the minimum and maximum values of the GHB-themed P5 report card as shown in Table 1.

$$N = \frac{\sum D}{\sum \text{Total students}} \times 100\% \dots \dots \dots \text{Formula 1}$$

Description:

N = % of students in a specific category

D = number of students in that category for the one dimension

$$P = \frac{\sum \text{Correct score}}{\sum \text{Maximum score}} \times 100 \dots \dots \dots \text{Formula 2}$$

Table 1 Categories based on P5 report score range GHB theme for 2023/2024 academic year

Interval	Category
25-39	Very not good
40-54	Not good
55-69	Quite good
70-84	Good
85-100	Very good

(Source: Widharyanto & Prijowuntato, 2021)

Table 2 Categories for cognitive understanding and affective awareness of 3R concepts

Interval	Category
≤20%	Very not good
21-40%	Not good
41-60%	Quite good
61-80%	Good
81-100%	Very good

(Source: Arikunto, 2010)

Table 3 Categories for relationship of cognitive understanding and affective awareness of 3R concepts

Correlation coefficient range (R)	Strength of the relationship
0.80-1.000	Very strong
0.50-0.799	Strong
0.40-0.599	Moderate
0.20-0.399	Low
0.00-1.999	Very low

(Source: Sugiyono, 2018)

The knowledge test consisted of 15 multiple-choice items and had been validated prior to data collection. The level of cognitive understanding related to 3R was then categorized based on Table 2. Next, the analysis to determine the level of affective awareness regarding the 3R concept was based on the average score of the awareness questionnaire, also expressed as a percentage and referring to Riduwan and Akdon (2008), using the Formula 2. The questionnaire consisted of 16 Likert-scale items that had been modified. The highest score for each statement was 4. The level of affective awareness related to 3R was then categorized based on Table 2.

Next, to determine the relationship between the implementation of the GHB theme project and knowledge and awareness related to 3R, a simple linear regression analysis was conducted for each variable separately. The preliminary steps included assumption tests such as normality test using the Kolmogorov-Smirnov method, homogeneity test, and linearity test. Next, the correlation coefficient value is categorized based on the range of relationship strength of the correlation coefficient (R) according to Sugiyono (2018), as presented in Table 3.

C. Results and discussion

The implementation of the GHB-themed P5 during the odd semester of the 2023/2024 academic year yielded an average score of 74.73, categorized as "Good." The highest student score was 100 and the lowest was 40. According to the category scale (25-39

= Very not good; 40-54= Not good; 55-69= Quite good; 70-84= Good; 85-100= Very Good), this result is considered "Good".

The success level of P5 GHB theme implementation for eighth grade students at SMP Negeri 2 Sungai Raya

The focus of the GHB-themed P5 program was the creation of student products or crafts in the form of Ecobricks, Ecoenzymes, and Ecoprints. The selection of these three projects was based on agreements made through discussions among the Principal, Vice Principal of Curriculum, Coordinator, and the P5 Facilitator Team at SMP Negeri 2 Sungai Raya (interview on September 4, 2024, unpublished). These activities enabled students not only to gain knowledge about the importance of environmental care but also to actively engage in real actions to reduce waste issues. The study by Sunandar et al. (2020) demonstrates that the ecobrick program is effective in reducing plastic waste volume while simultaneously enhancing participants' environmental knowledge and awareness through hands-on practices based on the 3R principles, integrating cognitive and affective aspects concurrently. These findings are consistent with Dewi and Supriyanto (2023), who state that the production of ecobricks teaches students the importance of separating organic and inorganic waste and highlights its positive environmental impacts.

Each aspect was assessed using four categories of student development levels: Beginning to Develop (BD), Developing (D), Developing as Expected (DE),

and Highly Developed (HD). After conversion, the overall average report score for the GHB-themed P5 implementation was 74.73 in the “Good” category (Table 4). The percentage of students in each category and dimension (collaboration and creativity) regarding the GHB-themed P5 project on Ecobricks, Ecoenzymes, and Ecoprints is shown in Figure 1. The highest percentage was in the “Developing as Expected” category: 51.29% for the collaboration dimension and 42.22% for the creativity dimension. The lowest percentage was in the “Beginning to Develop” category: 1.60% (collaboration) and 0% (creativity). The percentages in the “Developing” and “Highly Developed” categories were similar: collaboration (22.49% and 24.62%), creativity (30.22% and 27.56%). This shows that most students had achieved the “Developing as Expected” category, indicating conceptual understanding and appropriate attitudes aligned with the project goals. Students were able to carry out project activities under the guidance of facilitators including subject teachers, homeroom teachers, and the P5 GHB coordinator. This aligns with Komala et al. (2023), who emphasized that P5 activities support character development, particularly creativity, critical thinking, and collaboration.

Nevertheless, there were some challenges, such as limited time allocated by the school, as stated by Coordinator Kristiando Siburian, S.Pd. (interview, 4 September 2024). This resulted in suboptimal product completion. This finding also aligns with

Surbaningrum et al. (2025), who found that P5 activities still face various obstacles such as limited resources, teacher readiness, and insufficient time and space to ensure project sustainability. A comparison of the “Developing” (D) and “Highly Developed” (HD) categories showed an interesting pattern.

In the collaboration dimension, the HD category (24.62%) exceeded the D category (22.49%), indicating students’ ability to exceed expectations by demonstrating independence, creativity, and consistent positive behavior. In contrast, the creativity dimension showed a higher percentage of students in the D category (30.22%) than in the HD category (27.56%), indicating students had relatively good creativity during product development. However, this condition is reversed in the creative dimension, where a higher percentage of students is found in the “Greatly Developed” (27.56%) and “Is Developing” (30.22%) categories compared to the same categories in the collaborative dimension, which are 24.62% and 22.49%, respectively. Although the collaborative dimension shows a higher percentage in the “Develop According to Expectations” category (51.29%), the creative dimension demonstrates that students have shown good creative abilities in producing Ecobricks, Ecoenzymes, and Ecoprints. This suggests that students are already developing creativity that supports sustainable practices in the context of project-based learning.

Table 4 Average scores of students in psychomotoric, cognitive, and affective aspects SMPN 2 Sungai Raya

Total students	Average value per aspect			Category
	P5 report	Test	Questionnaire	
225	74.73	79.11	76.74	Good

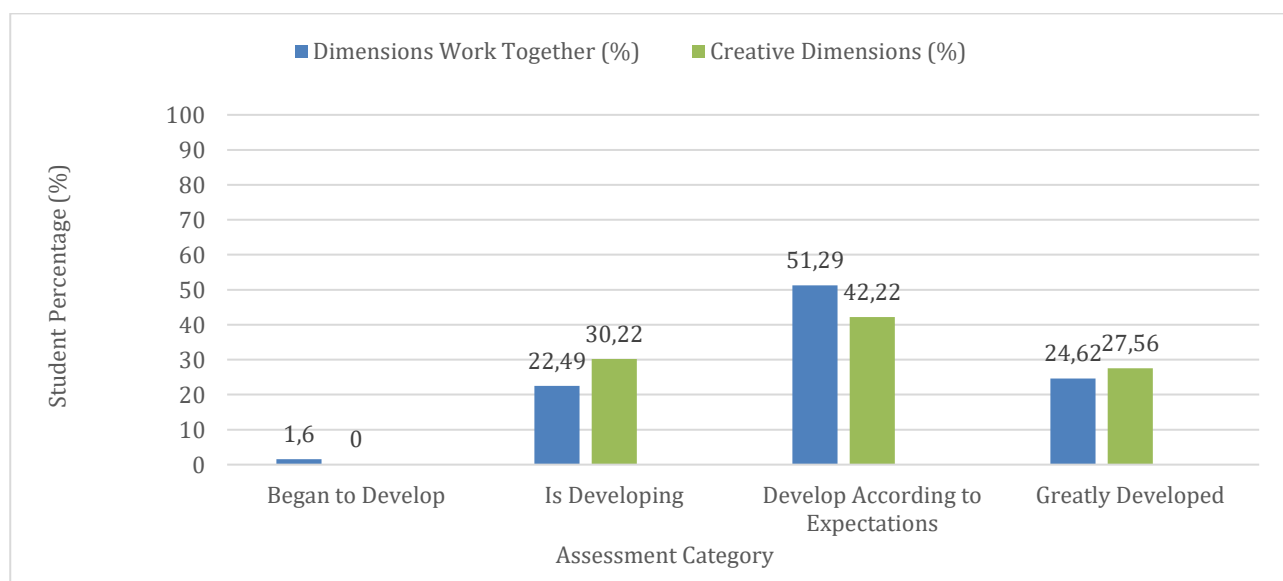


Figure 1

Percentage of students in the implementation of the P5 GHB theme across collaboration (blue bar) and creativity (green bar) dimensions on the topics of Ecobrick, Ecoenzyme, and Ecoprint at SMPN 2 Sungai Raya.

Students' cognitive understanding level of the 3R concept (Reuse, Reduce, Recycle)

The level of students' cognitive understanding of the 3R concept (reuse, reduce, recycle) at SMP Negeri 2 Sungai Raya was assessed through a multiple-choice test consisting of 15 questions. The test aimed to measure students' cognitive comprehension of the 3R principles.

The test items were based on three main conceptual aspects: understanding the meaning of 3R, identifying the importance of applying 3R principles, and recognizing activities that implement the 3R concept in the environment. The cognitive understanding of all students in the sample was measured by calculating the average score, which was 79.11 and categorized as "good." Overall, students had mastered nearly 80% of the material related to the 3R concept. The highest score obtained was 100, while the lowest was 20, indicating variations in students' understanding. These findings are in line with the study by Surbaningrum et al. (2025), which revealed that students at MTsN 10 Hulu Sungai Selatan had a high level of environmental knowledge, with an average score of 78.28, also reflecting a good understanding of environmental topics, including the 3R concept. In other words, students' cognitive knowledge still needs to be strengthened through more practical and experience-based learning so that they can better understand and distinguish each concept within the 3R principles more accurately and deeply. These findings are reinforced by the study conducted by Septiani and Ernawati (2025), which revealed that although most students were familiar

with the terms *reduce*, *reuse*, and *recycle*, only 28% demonstrated a high level of knowledge regarding plastic waste management efforts. This is consistent with the results related to Concept 1, where the majority of students were unable to identify activities that fall under the principle of *reuse*, such as repurposing used plastic bottles as planting containers.

These findings are consistent with Purba et al. (2024), who revealed that students often encounter difficulties in understanding material when test items are presented in a contextual format. This occurs because they have not yet developed the ability to transfer conceptual understanding into real-life problems. A lack of conceptual mastery is the main factor causing students to struggle with answering such questions. Therefore, strengthening students' understanding of basic concepts through a contextual approach is essential to help them apply concepts accurately in various situations. Meanwhile, in another study, Gea et al. (2025) demonstrated that the implementation of the Problem-Based Learning (PBL) model at SMP Negeri 1 Tuhemberua, North Nias Regency, North Sumatra Province, improved students' conceptual understanding from the "fair" category to the "good" category in science learning, including the 3R concept. These findings indicate that enhanced conceptual understanding has a positive impact on students' learning outcomes.

When cognitive understanding is broken down into five assessment categories across the three concepts, it is evident that most students fall into the "good" and "very good" categories (Table 5).

Table 5 Percentage of cognitive understanding level for each assessment category related to 3R in class IX (A-H) students of SMP Negeri 2 Sungai Raya

The concept tested	Percentage of students in each category (%)					Average value	Category
	VnG	NG	QG	G	VG		
Understand 3R concepts	2.22	8	8.44	42.67	38.67	72.00	Good
Identify the importance of applying the 3R concept	0.89	6.22	0	24.44	68.44	86.81	Very good
Identify activities that apply 3R concepts in the environment	0.44	2.67	7.11	26.22	63.56	87.44	Very good
Average	1.18	5.63	5.18	31.11	56.9	79,11	Good

Note: VnG = Very not good; NG = Not good; QG = Quite Good; G = Good; VG = Very good

For the understanding of the 3R concept (Concept I), 42.67% and 38.67% of students were categorized as good and very good, respectively. In identifying the importance of implementing the 3R concept (Concept II), 24.44% and 68.44% were in the good and very good categories. Meanwhile, in identifying activities that apply the 3R concept in daily life (Concept III), 26.22% and 63.56% of students were classified as good and very good, respectively. Overall, more than 80% of students achieved a very good level of understanding related to the 3R concept. However, when looking at the average

scores for each of the three cognitive understanding concepts, different categorizations emerge. For Concept II (identifying the importance of implementing the 3R concept) and Concept III (identifying activities that apply the 3R concept in daily life), the average scores were 86.81 and 87.44, respectively, both falling under the "very good" category. Meanwhile, the average score for Concept I (understanding the 3R concept) was 72, which is still in the "good" category. In general, the average cognitive understanding levels show that 56.89% of students were in the "very good" category and

31.11% in the "good" category. Based on the analysis of all three concepts, Concepts II and III achieved average scores in the "very good" category, while Concept I still fell into the "good" category. The highest average score was found in Concept III, at 87.44, categorized as very good, while the lowest average was in Concept I, at 72.

The overall percentage distribution of students across categories also varied. The highest total average percentage was in the "Very Good" category at 56.9%, while the lowest was in the "Very not good" (VnG) category at 1.18%. Interestingly, the "Good" (G) category showed a higher total average percentage (31.11%) compared to the "Quite good" (QG) and "Not good" (NG) categories, which had similar percentages at 5.63% and 5.18%, respectively. Despite these findings, when analyzed based on each tested concept, it was found that students' levels of understanding were uneven, and there were differences in mastery between the concepts. This is evident from the number of questions that students could answer correctly. Based on the coverage of the test questions, Concept I included 8 questions: numbers 1, 2, 6, 7, 9, 10, 13, and 15. Among these, questions 7 and 10 were designed as case studies or narratives, making them particularly effective in measuring the depth of students' understanding of the 3R concept. This illustrates the percentage of students who mastered the tested concepts. Based on the test coverage, Concept I consisted of 8 questions: numbers 1, 2, 6, 7, 9, 10, 13, and 15. Among these, questions 7 and 10 were designed in the form of case studies. Students encountered the greatest difficulty with question number 10 and number 7, both of which assessed their understanding of the 3R concept through contextual case-based questions. In question number 10, a total of 159 students (70.67%) answered incorrectly. The question asked students to identify the type of 3R principle applied in the "One Week One Plant" program. The case was described as follows: "Students are encouraged to bring any type of plant using used plastic bottles as pots or planting media. The use of these bottles aims to reduce the amount of used plastic bottle waste at school."

Students were expected to determine the type of 3R applied in this program, which is reuse, as the program reuses used plastic bottles as planting media rather than discarding or recycling them. However, many students mistakenly selected recycle, with 111 students (49.33%) choosing this option, while 41 students (18.22%) selected reduce. This misconception may stem from students' partial understanding of the 3R concept. Some students may misinterpret the use of plastic bottles as pots as a form of recycling, when in fact the process does not involve transforming the material into a new product. Meanwhile, students who chose to reduce might have thought that using the bottle as a pot meant reducing waste. These contextual question errors indicate that

students have not yet fully connected theoretical knowledge with its practical application in daily life. Many students still face difficulties in understanding the meaning of context-based questions, which leads to misinterpretation of the purpose or intent of the questions. The significant differences in answer choices highlight the need for reinforcing contextual and experiential learning approaches and linking them with the key concepts of 3R. In other words, students' cognitive understanding still requires strengthening through more practical, experience-based learning in order to properly comprehend and distinguish each concept within the 3R principles. These findings are in line with Purba et al. (2024), who stated that students often struggle with understanding material when questions are presented in a contextual format. This occurs because they have not yet developed the ability to transfer conceptual understanding to real-world problems.

This result contrasts with question number 7, which also assessed Concept I. In this case, more students answered correctly than incorrectly. A total of 158 students (70.22%) chose the correct answer, while 67 students (29.78%) answered incorrectly. The question was as follows:

"At the end of each semester, Harapan Jaya School collects organic waste such as vegetable scraps, rotten food, and dry leaves to recycle them into compost. This activity is an example of the application of..." with the following answer choices: a) Reduce; b) Reuse; c) Recycle; and d) Renew.

The correct answer is c) Recycle, because the school processes organic waste such as rotten vegetables, leftover food, and dry leaves into compost, which means transforming waste into a new useful product. This level of error indicates that some students still do not fully understand the concept of recycling, especially when it is presented in a real-life context. This suggests that practice-based learning approaches, such as project-based activities, are highly effective in helping students understand the direct application of 3R principles. This is also supported by Sylviaty et al. (2018), who explained that junior high school students tend to understand concepts more easily when they are taught in concrete and contextual ways. Therefore, biology lessons, including those covering the 3R concept, should ideally be designed to provide real experiences that can be internalized by students through hands-on activities, such as the implementation of the Sustainable Lifestyle project at SMP Negeri 2 Sungai Raya.

Students' affective awareness level related to 3R (Reuse, Reduce, Recycle)

Data collection on the affective (awareness) aspect related to 3R was conducted after students received their P5 project report cards. The data were collected from all student respondents using a questionnaire.

Table 6 Percentage of affective awareness levels for each assessment category related to the 3Rs among ninth-grade students (A-H) at SMPN 2 Sungai Raya

Aspect of consciousness tested	Percentage of students in each category (%)					Average value	Category
	VnG	NG	QG	G	VG		
Awareness to reuse items that can still be used (reuse)	0	0	2.67	68.00	29.33	77.20	Good
Awareness to reduce the use of disposable items and produce waste (reduce)	0	0	6.22	59.11	34.67	77.53	Good
Awareness to sort and recycle waste (recycle)	0	0.44	11.56	61.33	26.67	75.38	Good
Average	0	0.14	6.81	62.81	30.22	76.74	Good

Note: VnG = Very not good; NG = Not good; QG = Quite Good; G = Good; VG = Very good

Table 7 The results of the correlation coefficient (R) and determination coefficient (R²) tests on student knowledge

Variable	R	Rsquare	Sig.	Note
Knowledge	0.408	0.166	<0.001	Significant

The questionnaire consisted of 16 statements grouped into three main aspects: Aspect I (*Reuse*), Aspect II (*Reduce*), and Aspect III (*Recycle*). This indicates that, in general, students have developed a good level of awareness regarding the application of 3R principles both at school and at home. Based on the average score of the 3R-related awareness questionnaire, the students achieved an average of 76.74, which falls into the “Good” category. The highest questionnaire score was 95.31, and the lowest was 57.81. An analysis of affective awareness related to 3R among Grade IX students (classes A–H) at SMP Negeri 2 Sungai Raya showed an overall average score of 76.74, meaning that 76.74% of students (on a 100-point scale) already have a good level of awareness regarding 3R or environmental issues. According to Arikunto (2010), this score falls into the “Good” category, which ranges from 61–80%. These findings align with a study by Cahyono et al. (2023), which found that students at MTsN 10 Hulu Sungai Selatan had an average score of 71.69 in their attitudes toward waste management using the 3R method, also categorized as good. This shows that students’ affective awareness of the environment is also developing positively in that school.

The percentage scores of affective awareness for each aspect are presented in Table 6. The average scores were 77.20 for Aspect I (*Reduce*), 77.53 for Aspect II (*Reuse*), and 75.38 for Aspect III (*Recycle*). Only Aspect III recorded 0.44% of students in the “Not good” category. These results indicate that students demonstrate the strongest awareness in the Reduce aspect, reflecting efforts to minimize the use of disposable products. This finding aligns with Fatmawati (2025), who emphasized that integrating environmental education at the junior high school level strengthens students’ environmental awareness, and with Cahyono et al. (2023), who highlighted the effectiveness of the 3R method in fostering positive environmental attitudes. Although the Recycle aspect remained within the “Good” category, it showed the

lowest average score and included a small proportion (0.44%) of students in the “Very not good” category, unlike the other aspects (0%). This suggests that some students are not yet consistently engaged in recycling practices, possibly due to limited environmental support at home, which may hinder the internalization of sustainability values.

The normality test indicated Asymp. Sig. values of 0.001 and 0.010 for the 3R test and awareness questionnaire, respectively. Although these values suggest non-normal distribution, the Monte Carlo Sig. value of 0.200 (≥ 0.05) confirms that the data meet the assumption of normality for regression analysis. Midway & White (2025) noted that deviations from raw data normality generally have minimal impact on statistical power, particularly in large samples. The homogeneity test using Levene’s Test produced p-values of 0.319 and 0.718 (> 0.05), indicating homogeneous variance. Furthermore, the linearity test showed no significant deviation in the 3R test data ($p = 0.091 > 0.05$), while the questionnaire data indicated slight deviation ($p = 0.018 < 0.05$). Nevertheless, overall results support the use of a simple regression model in this study.

The relationship between the implementation of the GHB project and knowledge related to 3R

The relationship between the implementation of the P5 project with the Sustainable Lifestyle (GHB) theme and students’ knowledge related to 3R was analyzed using simple linear regression, referring to the SPSS output tables, namely the correlation coefficient (R), the coefficient of determination (R²), and the regression coefficient. The results of the linear regression analysis between the implementation of the GHB project and students’ knowledge related to 3R are presented in Table 7.

The analysis revealed a correlation coefficient (R) of 0.408, which, according to Sugiyono (2018), falls within the moderate category (0.40–0.599). This indicates a reasonably strong relationship between

the implementation of the GHB-themed project and students' knowledge of 3R principles. The coefficient of determination (R^2) further confirms the contribution of the project to improving students' understanding. These findings are consistent with Cahyono et al. (2023), who reported a moderate positive correlation ($r = 0.576$) between environmental knowledge and students' attitudes toward 3R-based waste management. Similarly, Lestari and Handayani (2023) emphasized that authentic environmental learning practices such as routine activities, green school programs, and supportive facilities significantly influence students' environmental awareness. Overall, the results demonstrate that strengthening knowledge through project-based environmental education plays a meaningful role in fostering students' affective awareness and environmentally responsible behavior.

The simple regression model for students' knowledge is formulated as $Y_1 = 45.643 + 0.448X$, with a determination coefficient (R^2) of 0.166, indicating that project implementation accounts for 16.6% of the variance in knowledge, while 83.4% is influenced by other factors. The regression coefficient (0.448) and t-value ($6.668 > 1.970$; $p < 0.001$) confirm a statistically significant positive effect, meaning that each one-unit increase in project implementation corresponds to a 0.448-point increase in students' knowledge. These findings align with Herlina et al. (2025), who reported a strong positive correlation between environmental knowledge and environmental care attitudes, emphasizing that

environmental education must integrate experiential learning. Practical activities such as ecobricks, ecoenzymes, and ecoprints exemplify this approach by enhancing students' understanding of 3R principles while fostering responsible waste management behaviors. Similar evidence was reported by Fitriani et al. (2024), who found that ecoenzyme projects improved students' knowledge, skills, and pro-environmental behavior, and by Nursanti et al. (2024), who demonstrated that ecobrick initiatives functioned both as waste solutions and as tools for developing critical thinking, collaboration, and environmental responsibility. Overall, hands-on project implementation not only strengthens students' knowledge of 3R concepts but also reinforces key dimensions of the Pancasila Student Profile, including collaboration, environmental awareness, and independence.

The relationship between the implementation of the GHB project and awareness related to 3R

The relationship between the implementation of the P5 project with the Sustainable Lifestyle (GHB) theme and students' awareness regarding 3R was analyzed using simple linear regression, referring to the SPSS output tables, specifically the correlation coefficient (R), the coefficient of determination (R^2), and the regression coefficient. The results of the linear regression analysis between the implementation of the GHB project and students' awareness of 3R are presented in Table 8.

Table 8 The results of the correlation coefficient (R) and determination coefficient (R Square) tests on student awareness

Variable	R	Rsquare	Sig.	Note
Awareness	0.200	0.040	0.003	Significant

The results indicate a correlation coefficient (R) of 0.200, which falls within the low category (0.20–0.399) according to Sugiyono (2018), suggesting a weak relationship between the GHB project implementation and students' awareness. The coefficient of determination (R^2) of 0.040 further shows that only 4% of the variance in awareness is explained by the project, while 96% is influenced by other factors. The regression model ($Y_2 = 69.521 + 0.097X$) demonstrates a positive effect, with an F-value of 9.272 ($p < 0.001$) and a t-value of 3.045 ($p = 0.003$), confirming statistical significance despite the small effect size. These findings imply that although the project contributes significantly to students' awareness, its practical impact remains limited.

This pattern aligns with Poety et al. (2017), who argued that knowledge does not automatically translate into positive environmental behavior, as students may understand concepts theoretically without consistently applying them. Similar

observations were reported by Rahayu et al. (2024), who identified limited waste-sorting skills and inadequate knowledge of recycling practices as barriers to optimal pro-environmental behavior. However, consistent with Febriani et al. (2024) and Rahsia et al. (2025), project-based and participatory learning approaches still demonstrate potential to strengthen character development and sustainability awareness when implemented intensively and systematically. Therefore, although the contribution of the GHB project to awareness is relatively small, it remains an important foundation for cultivating students' initial understanding and engagement in sustainable waste management practices.

The findings indicate that although the effect size is modest, the implementation of the GHB project at SMP Negeri 2 Sungai Raya positively influences students' understanding and awareness of 3R principles. Simple linear regression analysis shows a significant effect on the knowledge variable (Y_1), with

a regression coefficient of 0.448, $t = 6.668$ (> 1.970), and $p = 0.001$ (< 0.05), meaning that each one-unit increase in project implementation raises students' knowledge by 0.448 points. However, its influence on awareness is weaker, suggesting a gap between cognitive gains and affective development. This pattern supports previous findings that limited waste-sorting skills and insufficient waste-processing knowledge hinder the formation of optimal environmental behavior, although project-based initiatives remain effective in building initial awareness. Consistent with Surbaningrum et al. (2025), the GHB themed P5 project contributes positively to strengthening environmental awareness, particularly through hands-on products such as ecobricks, ecoenzymes, and ecoprints, which foster creativity and collaboration. Nevertheless, the results indicate that project activities more strongly enhance cognitive outcomes than sustained awareness, highlighting the need for continuous habituation and consistent environmental support within the school setting.

The findings indicate that project-based learning is more effective in strengthening students' conceptual understanding than in cultivating critical thinking and affective development, which require

sustained habituation and reflective practice. Similar conclusions were reported by Febrianti et al. (2022), who found that direct student involvement improves cognitive outcomes more readily than affective skills. Consequently, teachers at the junior high school level should not only emphasize cognitive achievement but also integrate character-building strategies such as value discussions, modeling, and structured reflection to support affective growth. Although students' awareness of 3R principles at SMP Negeri 2 Sungai Raya is not yet optimal, the GHB project functions as an effective contextual learning medium that promotes environmental values through meaningful, hands-on activities. Comparable evidence from Handayana et al. (2020) demonstrated that zero-waste initiatives gradually increased students' awareness and participation despite initially low understanding. Therefore, the GHB project can be considered a strategic initial step in developing environmental awareness, while deeper and more consistent behavioral change requires continuous reinforcement within the school environment. The relationship between the implementation of the GHB-themed project and students' knowledge and awareness of the 3R principles at SMP Negeri 2 Sungai Raya is presented in Table 9.

Table 9 The relationship between the implementation of the GHB theme project and knowledge and awareness regarding 3R among students of SMPN 2 Sungai Raya

Variable	Regression coefficient	T _{count}	T _{table}	Significant (p-value)	Results
Y ₁ (Knowledge)	0.448	6.668	1.970	0.001 (< 0.05)	Significant (H ₀ is rejected, H ₁ accepted)
Y ₂ (Awareness)	0.097	3.045	1.970	0.003 (< 0.05)	Significant (H ₀ rejected, H ₁ accepted)

The simple linear regression analysis demonstrates that the implementation of the P5 Sustainable Lifestyle (GHB) project significantly influences both students' knowledge and awareness of 3R principles. For the knowledge variable (Y₁), the regression coefficient is 0.448 ($t = 6.668$; $p = 0.001 < 0.05$), indicating that each one-unit increase in project implementation raises students' knowledge by 0.448 units. For the awareness variable (Y₂), the coefficient is 0.097 ($t = 3.045$; $p = 0.003 < 0.05$), confirming a positive but smaller effect on awareness. These findings suggest that the project exerts a stronger impact on cognitive outcomes than on affective development.

The positive relationship is reflected in tangible project outputs such as ecobricks, ecoenzymes, and ecoprints, which foster creativity and collaboration. However, a gap remains between students' conceptual understanding and the consistent application of 3R practices at school. This indicates that while knowledge can be enhanced effectively through direct project engagement, strengthening awareness and attitudes requires sustained habituation and continuous environmental support. Consistent with Febriani et al. (2024), project-based

learning more readily improves conceptual understanding than critical thinking and value internalization, which demand reflective practice. Therefore, teachers should complement cognitive-focused activities with character-building strategies such as value-based discussions, modeling, and structured reflection to promote holistic affective development.

The findings indicate that direct involvement in project-based activities more effectively strengthens students' conceptual understanding than affective development, which requires sustained habituation and reflective practice. Similar evidence from Handayana et al. (2020) demonstrated that although students initially had limited understanding of 3R concepts, participation in a zero-waste initiative gradually increased their awareness and engagement. In this context, the GHB-themed P5 project at SMP Negeri 2 Sungai Raya serves as a strategic starting point for cultivating environmental awareness through meaningful, hands-on learning experiences. However, while overall implementation has been effective, students' cognitive and affective achievements remain within the "good" category and have not been evenly attained. Test and questionnaire

results reveal that some students still lack a full understanding of applying 3R principles in daily life, indicating a gap between knowledge acquisition and behavioral practice. These results highlight the need for continuous reinforcement, structured habituation programs, and consistent school-wide support to optimize outcomes. Beyond fulfilling administrative requirements, the P5 Sustainable Lifestyle project should function as a transformative learning strategy that systematically integrates value-based discussions, modeling, and reflective activities. When implemented consistently, such an approach can more effectively strengthen students' knowledge, awareness, and environmentally responsible attitudes, contributing to the development of a sustainable school culture

D. Conclusion

The success level of implementing the Strengthening the Profile of Pancasila Students (P5) project with the "Sustainable Lifestyle" theme for ninth-grade students (classes A–H) was classified as "good," with an average score of 74.73. Within a year gap time of the project, the level of cognitive understanding and affective awareness related to the 3R principles was also categorized as "good," with average scores of 79.11 and 76.74, respectively. The P5 GHB theme had a positive influence, with a regression coefficient of 0.448 and a moderate effect on students' knowledge. The regression model is as follows: $Y_1 = 45.643 + 0.448(X)$. The implementation of the GHB theme contributed 16.6% to the increase in students' knowledge related to 3R, while the remaining 83.4% is explained by other factors outside the scope of this study. As for the awareness variable, the GHB theme also had a positive influence with a regression coefficient of 0.097 and a low correlation strength on students' awareness. The regression model is $Y_2 = 69.521 + 0.097(X)$. Although it shows positive influence, the contribution of the GHB theme implementation is considered very little, with only 4% to the increase in students' awareness of 3R, while the remaining 96% explained by factors beyond this research model. In concluding the model, it is also worth to mention that there is the use of report card conversion to numeric scale which may affect the model. These findings may serve as an initial indicator for evaluating and designing more measurable and structured sustainable education programs in the future, including policies that replace the P5 program. Furthermore, future research may be conducted to analyze the relationship between knowledge or awareness and sustainable environmental issues.

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