JPPIPA 12(1) (2026)

Jurnal Penelitian Pendidikan IPA

http://jppipa.unram.ac.id/index.php/jppipa/index

Adiwiyata: Integrating Environmental Education and *PKLH-Based Sustainability* into Teaching and Learning

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Received: November 13, 2025
Revised: December 23, 2025
Accepted: January 25, 2026
Published: January 31, 2026

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DOI: 10.29303/jppipa.v12i1.13875

Abstract: Population and Environmental Education (PKLH) learning plays a strategic role in addressing global issues such as climate change, pollution, and ecosystem degradation. This research was conducted at SMP Negeri 1 Tinggi Moncong, Gowa Regency, over one semester of the 2024/2025 academic year. This study aims to analyze the effectiveness of integrated PKLH teaching in improving students' ecological knowledge, attitudes, and skills; to identify implementation challenges; and to evaluate the internalization of the concepts of sustainability, pollution, and conservation. This research uses a quantitative approach with a correlational design and simple regression analysis. The data collection methods in this study used four main techniques: questionnaires, interviews, observation, and documentation. The findings indicate that the integration of PKLH significantly contributes to balanced development across the cognitive, affective, and psychomotor domains, reflecting meaningful and environmentally oriented learning. However, its implementation faces obstacles, including limited environmental literacy and low student engagement in real-life ecological activities. The study concludes that the integration of PKLH has the potential to strengthen a culture of sustainable education and stimulate student participation in pro-environmental practices. Implications for schools include expanding training for school staff, ensuring environmental infrastructure support, and developing contextual learning grounded in sustainability.

Keywords: Environmental Education; Sustainability; PKLH; Integrated Learning; Adiwiyata Program; Student Ecoliteracy

Introduction

The integrated Population and Environmental Education (PKLH) learning with other subjects at SMP Wiyata Mandala begins with an awareness of the importance of environmental education for students, especially at SMP Negeri 1 Tinggimoncong. Amidst increasing global issues such as climate change, pollution, and ecosystem degradation, environmental education serves as a strategic means to foster students' awareness and responsibility for environmental conservation. It is emphasized that the development of an Adiwiyata-based curriculum can improve students' abilities in real-life practices, including designing new policies related to the school environment (Haryadi & Widodo, 2020). Meanwhile, Aswan (2022); Utami & Sanjaya, (2025) have shown that the Civics subject plays an important role in shaping characters who care about the environment. The integration of environmental values into the Civics curriculum has proven effective in increasing students' awareness, attitudes, and actions toward nature conservation. This learning approach also trains critical thinking skills and encourages creative solutions to build a more environmentally conscious generation. In line with the principles of Wawasan Di Wiyata Mandala, this school is positioned as an educational environment whose responsibilities involve the principal, teachers, parents, and the community. These principles encompass the role of schools in fostering a positive environmental culture through collaboration and participation among all school members.

How to Cite:
Jamil, & Hasanuddin. Adiwiyata: Integrating Environmental Education and PKLH-Based Sustainability into Teaching and Learning. *Jurnal Penelitian Pendidikan IPA*, *12*(1), 117-128. https://doi.org/10.29303/jppipa.v12i1.13875

The integration of Population and Environmental Education (PKLH) with other subjects such as Science, Social Studies, and Indonesian allows for more contextual learning. Students not only learn theory but also apply their knowledge through concrete actions that reflect environmental awareness. This approach aims to develop students' cognitive, effective, and psychomotor competencies so that they can think critically, demonstrate environmental awareness, and possess relevant practical skills. At SMP Negeri 1 Tinggimoncong, Gowa Regency, this approach has yielded significant achievements, including receiving the Adiwiyata Award and the Mandiri Award in 2023, thanks to collaboration between the school, the Education Office, and the Population and Environmental Office. Science learning, for example, has demonstrated a crucial role in fostering environmental awareness through environmentally oriented learning objectives and the implementation of the Student-Centered Learning model (Hasyim & Aprita, 2021). Teacher support in developing integrated learning indicators and utilizing environmentally friendly facilities and infrastructure also strengthens the implementation of the Adiwiyata program. Furthermore, Rizal et al. (2025) show that local cultural elements such as the Gonggati folktale, the Posisani song, and the Pusentase tourist attraction have the potential to serve as learning resources for environmental themes, thus preserving traditional values in thematic learning. However, several challenges are still faced, such as the difficulty of teachers in designing integrated learning indicators for general subjects and limited student involvement in direct environmental problem-solving activities. This integrated approach is consistent with the principles of Wawasan. Adiwiyata Mandala, which emphasizes the role of schools as educational environments involving shared responsibilities between the principal, teachers, students, and the community.

The legal basis for environmental education programs in schools is based on Law Number 20 of 2003 concerning the National Education System, which emphasizes the importance of developing student competencies, including environmental awareness. Furthermore, Minister of Environment Regulation Number 5 of 2013 encourages schools to integrate environmental education into the curriculum. The 2013 Curriculum (K13) supports a thematic-integrative approach that allows environmental issues to be incorporated into the learning process (Haryadi & Widodo, 2020). This indicates that the development of an Adiwiyata-based curriculum has special characteristics, aligning the curriculum with Adiwiyata principles to improve students' practical life skills. This is done through the identification of core concepts and the formulation of new policies related to the implementation of the Adiwiyata program in schools. Furthermore, Rokhmah (2019); Yunita et al. (2022) revealed that the implementation of environmentally-based curriculum innovations in the Adiwiyata program faces various obstacles, such as limited teacher capacity, student engagement, and school facilities. Proposed solutions include providing training and guidance to students to improve their understanding and participation in the program. In general, the development of an Adiwiyata-based curriculum aims to shape students with environmental awareness and a culture of cleanliness, as well as the ability to apply practical skills in their daily lives.

The success of SMPN 1 Tinggimoncong, Gowa Regency, in achieving the Adiwiyata Award is evidence of the implementation of systematic and structured learning that integrates cognitive, affective, and psychomotor aspects into environmental issues. The Adiwiyata Award is given to schools that consistently implement environmental programs for three consecutive years, and in 2024, the school successfully achieved a national level award. In line with Mei & Mamluah (2024) the integration of the Adiwiyata program at SMP Negeri 4 Jambi City demonstrates the school's success in meeting government standards, supported by strong leadership, active participation of the school community, and sustainable development, although it still tends to be oriented towards achieving awards. Meanwhile, Rachmawati et al. (2023) emphasized that the success of the program can be seen from the formation of a culture of environmental care, participation of the school community, support from the Surabaya Environmental Agency (DLH), and the presence of green plants as an indicator of achieving environmental policy standards. Furthermore, SMPN 1 Tinggimoncong is committed to developing its program towards the Adiwiyata Award. Independent Level as part of the school's vision and mission to integrate environmental education into the curriculum.

SMPN 1 Tinggimoncong has established a policy that all school programs must aim to achieve Adiwiyata Mandiri status as a commitment to developing an environmentally-based school. This policy reflects the synergy between the school and the community in preserving and protecting the environment. In 2024, the school received the Provincial Adiwiyata Award for its implementation of sustainable and environmentally friendly education. This commitment to environmental preservation is demonstrated through innovative and sustainable programs at both the local and national levels. In Population and Environmental Education (PKLH), the cognitive domain encompasses students'

understanding of environmental issues such as pollution and sustainability, enabling them to analyze problems and formulate solutions. PKLH Ardiansyah (2025) emphasizes the need to raise awareness among policymakers, principals, teachers, and students to instill environmental values not only through classroom learning but also through extracurricular activities. In the affective domain, PKLH aims to develop students' environmental awareness, sense of responsibility, and love of nature through discussion and reflection. Meanwhile, the psychomotor domain trains practical skills such as planting trees and sorting waste to encourage concrete actions. Nidhana & Khoirunnisa (2025) research shows that environmental commitment, awareness, a green lifestyle, and green self-efficacy contribute to pro-environmental behavior. Similarly Ali et al. (2024), found that ecological literacy, such as 'Let's Clean Up' and 'Let's Live Healthy', has been found to encourage students to practice clean, healthy, and environmentally friendly behaviors at school and at home.

Learning integrates students' knowledge, attitudes, and skills so that they are able to understand sustainability issues, apply environmental values, and develop relevant practical skills. Synergy between school and community involvement is a crucial element in maintaining environmental sustainability, particularly in the context of Population and Environmental Education (PKLH). Suherman et al. (2023) stated that environmental apathy remains a major problem. Schools play a role in fostering environmentally friendly behavior through curriculum development, participatory activities, and infrastructure. Supporting factors include intellectual motivation, stakeholder involvement, a consistent Adiwiyata team, and adequate facilities, while barriers include limited budgets, weak habit control, and minimal parental and community involvement.

This study focuses on the consistency of learning implementation that integrates the cognitive, affective, and psychomotor domains, referring to the basic concepts of education and learning development theory. These three domains support each other in helping students gain a holistic understanding of population and environmental education. Based on data from previous studies (Jusoh et al., 2018; Wisman & Santoso, 2024), students' understanding of the environment includes awareness of the negative impacts of excessive exploitation of nature. Thus, environmental education plays a crucial role in enhancing students' ecoliteracy—the ability to understand, feel, and act ecologically toward their surroundings. In terms of skills, this program engages students in various practical activities related to environmental management. Students are trained to make compost, sort waste, plant and care for vegetation, and reuse materials to create useful products. Therefore, through knowledge, attitudes, and skills, students not only gain theoretical understanding but are also able to apply their knowledge in their daily lives as a form of environmental awareness.

The novelty of this research lies in its in-depth study of the implementation of the Adiwiyata Program, which specifically emphasizes the integration of Environmental and Sustainability Education (PKLH) into classroom teaching and learning processes, not merely as school policies or supporting activities. This research examines how sustainability values and environmental awareness are systematically internalized in learning objectives, teaching materials, methods, and student learning activities across various subjects. Thus, this research offers a new perspective on Adiwiyata as a pedagogical approach oriented toward the learning process, rather than merely as an administrative or symbolic program for environmentally conscious schools.

This research is important because the implementation of the Adiwiyata Program in many schools still tends to focus on meeting physical and administrative indicators, such as environmental cleanliness and completeness of documents, while the integration of PKLH into learning practices has not been optimal. Yet, increasingly complex environmental challenges demand learning that can shape students' awareness, attitudes, and sustainable behavior from an early age. Therefore, this research makes an important contribution by providing an empirical basis and practical recommendations for educators and schools to optimize Adiwiyata as a meaningful learning tool that can foster ecoliteracy and sustainable environmental responsibility in students.

In Environmental Education (PKLH) learning, cognitive, affective, and psychomotor variables are important and interrelated elements that support the achievement of holistic learning objectives (Byla et al., 2024). Cognitive variables relate to students' knowledge and understanding of environmental issues such as the impact of pollution, recycling, and natural resource conservation. By understanding these materials, students are able to develop analytical and critical skills in assessing environmental problems and formulating appropriate solutions. Bloom's Taxonomy of Cognitive Domain Theory is one of the most commonly applied theories in the cognitive domain. The cognitive domain includes several levels of knowledge: remembering, understanding, applying, analyzing, evaluating, and creating. In the context of PKLH, this theory is useful for assessing how students understand and apply environmental concepts such as sustainability or the

impact of pollution. For example, students might start by remembering the types of pollution, then move on to the application stage by finding solutions to reduce waste in their school.

In the context of Environmental Education (PKLH), theories related to cognitive, affective, and psychomotor variables refer to several fundamental concepts of education and learning development that integrate these three domains. These theories support each other in helping students gain a comprehensive understanding of environmental education. Students with strong cognitive abilities understand the importance of protecting the environment, students with a well-developed affective domain demonstrate a caring attitude, and skills in the psychomotor domain enable them to take concrete actions. Kusworo & Arsil (2024) stated that the constitution should address concerns about environmental degradation. Although the 1945 Constitution includes environmental articles, their implementation remains only formal. The development of the new capital city (IKN) as a smart forest city has not been studied in depth, which has led to deforestation. This normative study shows that the recognition of the 1945 Constitution as a green constitution lags behind the French and Ecuadorian constitutions, which have incorporated environmental norms constitutionally.

The urgency of this research arises from the increasing global environmental crises such as climate change, pollution, and ecosystem degradation, which demand that education not only provides conceptual knowledge but also fosters students' ecological awareness and environmental behavior in real life. The implementation of Environmental and Population Education (PKLH) in teaching is still partial, theoretical, and inconsistent in producing measurable ecological competencies. Therefore, this study offers a scientific contribution: it examines the effectiveness of integrated PKLH teaching holistically across the three domains of cognitive, affective, and psychomotor development while analyzing the relationship between the internalization of the concepts of sustainability, pollution, and conservation and students' real-life practices. The novelty of this study lies in the assessment of PKLH integration that not only focuses on increasing knowledge but also simultaneously evaluates observable ecological attitudes and environmental behavior, thus providing a comprehensive picture of the impact of sustainability-based learning.

The objectives of this study were to (1) analyze the effectiveness of integrated PKLH teaching in improving students' ecological knowledge, attitudes, and skills; (2) identify challenges in implementing integrated PKLH learning; and (3) evaluate the extent to which students apply the concepts of sustainability, pollution, and conservation after participating in PKLH learning. In the cognitive domain, students are expected to develop a deep understanding of environmental management; in the affective domain, to demonstrate concern for ecological issues; and in the psychomotor domain, to take concrete actions that support environmental conservation. This study is expected to provide added value to educational practice by presenting a PKLH implementation model that is oriented toward changing ecological behavior rather than simply conveying knowledge, thereby contributing to the development of a generation that is actively involved in protecting the environment.

Method

This research is a quantitative study using a survey method, applying simple linear regression analysis combined with quantitative descriptive analysis. This research is a correlational study, which aims to determine the relationship or association between two or more variables without providing direct treatment to the research subjects. The research design uses simple and multiple regression analysis to examine the extent to which the independent variables influence the dependent variable, particularly in the context of integrated learning with Population and Environmental Education (PKLH).

This research was conducted at SMP Negeri 1 Tinggi Moncong, Gowa Regency, over one semester of the 2024/2025 academic year. This school was selected because it consistently implements integrated learning activities based on Environmental and Population Education (PKLH). The population of this study consisted of all students at SMP Negeri 1 Tinggi Moncong, and the sample was selected randomly (random sampling), consisting of 200 students in grades VIII and IX and 20 teachers. The selection of students in grades VIII and IX was carried out because they had completed more than two years or two academic periods of integrated PKLH learning, so they were considered to have sufficient experience and understanding of its implementation. Thus, the data obtained from respondents were expected to be more accurate in describing the level of knowledge, attitudes, and skills of students regarding environmental education.

The data collection methods in this study used four main techniques: questionnaires, interviews, observation, and documentation. The questionnaire was used as the main technique to measure the level of knowledge, attitudes, and skills of students in integrated PKLH learning. The questionnaire instrument used a Likert scale with five answer choices, ranging from strongly disagree to strongly agree. Interviews were

conducted with teachers and students to obtain supporting data that strengthened the questionnaire results, while observations were used to monitor the implementation process of integrated PKLH learning and student behavior in the classroom. In addition, documentation was used to review learning-related documents such as syllabi, lesson plans, and school activity records relevant to PKLH implementation.

The data obtained were analyzed using two approaches: quantitative descriptive analysis and multiple linear regression analysis. Descriptive analysis was used to describe the results of data regarding students' perceptions, attitudes, and skills in PKLH learning, while multiple linear regression analysis was applied to determine the influence of independent variables (knowledge, attitudes, and skills) on the dependent variable (the effectiveness of PKLH integrated learning). To ensure the validity of the instrument, a validity test was conducted using the Gregory technique, and the results showed that 48 items in the questionnaire were valid. By combining various data collection and analysis techniques, this study is expected to provide a comprehensive picture of the effectiveness of PKLH integrated learning in improving students' knowledge, attitudes, and skills.

Results and Discussion

Results

The data obtained from the survey were analyzed using correlational research with multiple linear regression analysis. This analysis was used to determine the effectiveness of the integrated PKLH learning approach as an independent variable in relation to students' knowledge, attitudes, and skills as dependent variables in Adiwiyata Mandala recipient schools. Through multiple regression analysis, the extent to which the integrated PKLH learning approach contributed to the improvement of these aspects was identified. This study involved 200 student respondents as the research sample. The results of the simple regression analysis between the independent and dependent variables are presented in Table 1.

Table 1. Summary of model output

Model	R	R Square	Adjusted R Squared	Standard Error of Estimate
1	0.632 [a]	0.400	0.384	8.22566

The results of the multiple regression analysis in Table 2 show that the R value of 0.632 indicates a fairly strong relationship between the independent variables (psychomotor, affective, and cognitive) and the dependent variable, namely the results of integrated PKLH learning. The R Square value of 0.400 means that approximately 40% of the variation in learning outcomes can be explained by these three variables. Meanwhile, the adjusted R Square value of 0.384 indicates that after considering the number of independent variables, approximately 38.4% of the variation in learning outcomes can still be explained. The standard error of the estimate of 8.22656 indicates how far the predicted learning outcome values vary from the actual values. These results indicate that integrated PKLH learning has a significant influence on improving students' knowledge, attitudes, and skills at SMP 1 Tinggi Moncong.

Table 2. Anova output

Model	Sum of Squares	df	Mean Square	F	Signature
Regression	5231.125	3	1743.708	25.771	0.000 [b]
Remainder	7848.741	116	67.662		
Total	13079.867	119			

The results of the ANOVA analysis in Table 2 show that the regression model used in this study is significant, with an F value of 25.771 and a very small p value (Sig.) of 0.000. This indicates that there is a significant influence of the independent variables (psychomotor, affective, and cognitive) on the dependent variable, namely the results of integrated PKLH learning. The Sum of Squares value for the regression is 5231.125, which represents the variation explained by the model, while the residual Sum of Squares value of 7848.741 represents the unexplained variation. Thus, these results indicate that integrated PKLH learning is effective in improving students' knowledge, attitudes, and skills at SMP 1 Tinggimoncong, and that the regression model used is reliable in explaining this relationship.

Table 3 in the results of the multiple regression coefficient analysis shows that all independent variables Cognitive, Affective, and Psychomotor have a significant influence on the results of integrated PKLH learning. The coefficient for the Cognitive variable is 0.355, which means that for every one unit increase in the Cognitive variable, the results of integrated PKLH learning increase by 0.355 units. The t-value of 2.036 and the p-value (Sig.) of 0.044 indicate that the effectiveness of this variable is significant, indicating that the increase in students' cognitive abilities contributes positively to learning outcomes. Meanwhile, the Affective variable

has a coefficient of 1.188, indicating that every one unit increase in the Affective variable increases the results of integrated PKLH learning by 1.188 units. With a t-value of 2.194 and a p-value of 0.030, the effectiveness of the Affective variable is also significant. This indicates that students' attitudes and emotions during learning have a strong influence on their achievements. As for the Psychomotor variable, the coefficient is 0.367, meaning that every one unit increase in this variable increases the integrated PKLH learning outcomes by 0.367 units. The t-value of 2.113 and the p-value of 0.037 indicate that the effectiveness of the Psychomotor variable is also significant. This indicates that students' practical skills in learning make a positive contribution to their final results. Overall, the three Cognitive, Affective, and Psychomotor variables show significant effectiveness in improving the knowledge, attitudes, and skills of students at SMP 1 Tinggi. Moncong, supporting the success of integrated PKLH learning.

Table 3. Output coefficient

Model	Unstandardized Coefficient (B)	Standard Error	Standardized Beta Coefficient	T	Significance (Sig)
(Constant)	4.523	7.852		0.576	0.566
Cognitive	0.355	0.174	0.280	2.036	0.044
Affective	0.188	0.086	0.177	2,194	0.030
Psychomotor	0.367	0.174	0.279	2,113	0.037

The challenge data, based on the average results of the study, provide an overview of the percentage of success in the aspects of knowledge (cognitive), attitude (affective), and skills (psychomotor) achieved by teachers and students in the implementation of integrated PKLH learning. This data serves as a reference for assessing the extent to which both parties have achieved effectiveness in implementing environmental-based learning. The percentages presented reflect the differences in achievement between teachers and students in each aspect, thus offering an initial overview of existing strengths as well as areas that need improvement in the PKLH learning process. A reference for identifying challenges in integrating PKLH can be seen through the percentage level of success in each aspect. This percentage shows the difference in achievement between teachers and students, providing an overview of existing strengths and areas that still need improvement in the PKLH learning process.

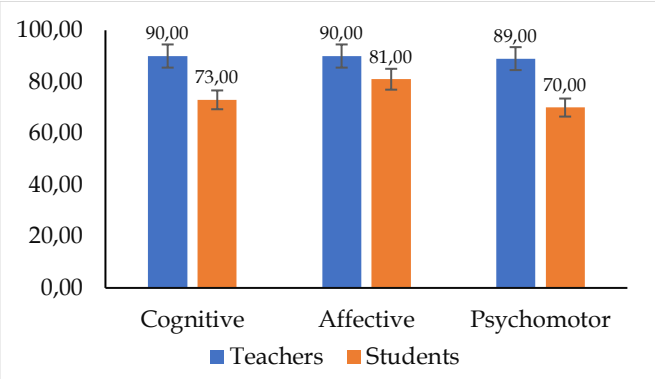

Figure 1. Percentage of Success in the Aspects of Knowledge, Attitude, and Skills

Based on the percentage results in Figure 1 regarding success in the cognitive, affective, and psychomotor aspects, it is clear that the implementation of integrated PKLH learning has been carried out quite well from the teacher's perspective, but has not yet fully produced optimal results among students. In the cognitive aspect, teachers showed a 90% success rate, while students only achieved 73%. This gap indicates that although teachers have understood the PKLH concept and school environmental policies, the transfer of knowledge has not been fully internalized by students. Challenges that arise are related to teachers' ability to connect school policies with individual responsibility toward the environment, resulting in students having difficulty explaining the objectives of environmental policies and the role of school infrastructure in supporting environmentally friendly practices.

From an affective perspective, teacher and student achievement were relatively balanced, reaching 90% and 81%, respectively. This indicates that PKLH learning is quite successful in fostering students' awareness and positive attitudes toward the environment. However, teachers still face challenges in appreciating students' contributions, engaging them in discussions about the importance of environmental education, and providing concrete examples of the use of environmentally friendly infrastructure. This situation has resulted in students' sense of environmental concern not developing optimally, as some students only feel more engaged when given the opportunity to directly participate in environmental activities.

The psychomotor aspect showed the largest gap between teachers and students, with teachers scoring 89% and students scoring only 70%. This difference indicates that students' practical skills in implementing environmentally friendly behaviors are still low. The main challenge for teachers lies in the use of learning

methods that place less emphasis on hands-on experience and provide limited feedback on the skills demonstrated by students. As a result, students are not yet fully capable of maintaining or properly using the school's environmental infrastructure. Overall, these data indicate that although teachers already have a good understanding, attitude, and skills related to PKLH, improvements in teaching strategies are needed to more effectively transfer this knowledge and skills to students.

Regarding the results of interviews and observations, the application of the concepts of sustainability, pollution, and conservation by students after participating in PKLH learning showed positive behavioral changes, although with varying levels of consistency. From the interview results, most students stated that they have begun to understand the importance of protecting the environment and have tried to adopt environmentally friendly habits, such as saving electricity, bringing their own water bottles, and reducing the use of single-use plastics. In the concept of sustainability, students reported being more aware of the importance of using resources wisely. In the concept of pollution, students mentioned efforts to maintain cleanliness at school and at home, while in the concept of conservation, several students were involved in planting and caring for plants. Observations in the school environment showed that these behaviors have begun to emerge in daily activities, such as disposing of trash in the right place, participating in greening activities, and joining the classroom cleanliness program. However, some students were still found to be inconsistent, for example, in reducing plastic use or maintaining cleanliness in certain areas. In general, the application of these three concepts was categorized as good, with the note that maintaining these behaviors requires continuous habituation.

Discussion

Integrated learning of Population and Environmental Education (PKLH) is designed to develop students who not only understand concepts but also have an environmentally conscious attitude and skills in addressing real-world problems. One important indicator of an environmentally cultured Adiwiyata school is the development of environmentally based learning through the integrated delivery of environmental materials (Athoillah et al., 2024; Partono et al., 2020). The development of various learning models and methods provides students with an understanding of the importance of the environment, which is linked to everyday environmental issues and community-based environmental problems. This also involves the development of environmentally and culturally based learning methods and curricular activities to increase students' knowledge and awareness of environmental conservation. The Aprilia et al. (2024) Adiwiyata program report includes environmentally oriented policies and a sustainability-based curriculum, as well as personal development activities related to environmental protection. Furthermore, Labobar & Kapojos (2023) examined the implementation of environmental education in junior high schools in Sentani Regency and its impact on students' ecological literacy were examined. The integration of the curriculum and school activities had a positive effect on environmental awareness, although challenges remain in connecting content to the local context, with program effectiveness shaped by external and internal factors across students' cognitive, affective, and psychomotor domains.

The analysis results show that PKLH has a significant influence on all three aspects, although with varying degrees of impact. The Adiwiyata program contributes to shaping students' ecological literacy and increasing public environmental awareness. The implementation of green economic education has been carried out effectively, as demonstrated by students' high interest and understanding of environmental education, as well as their ability to apply this knowledge in everyday life (Ismail et al., 2024). Furthermore, Nursanti (2024) study examines the implementation of ecobricks as an innovation in environmental-based learning in schools. Using a qualitative descriptive method with a Participatory Action Research approach, students are involved in collecting and processing plastic waste into ecobricks. As a result, this program has succeeded in reducing plastic waste and increasing students' awareness and concern for environmental management.

First, from a cognitive aspect, PKLH learning provides a significant contribution in improving students' understanding of the learning material, especially in connecting concepts with current population and environmental issues. This shows that the contextual approach in PKLH can develop students' critical and reflective thinking capacity toward global and local issues. Schools continue to strive to improve environmental literacy to build a strong and sustainable culture of environmental awareness among students. This is supported by Munarun et al. (2025) who analyzed the strategy of integrating Islamic Education (PAI) values in the Adiwiyata program at SMPN 23 Semarang which increased students' environmental awareness. Through interviews, observations, and documentation, it was found that the integrated curriculum, teacher training, participatory activities, and community collaboration effectively shape students' religious

character and holistic responsibility toward the environment.

From an affective perspective, it is evident that the integration of values such as caring, social responsibility, and environmental awareness into the learning process has a significant impact on shaping students' character. Irawati et al. (2024) stated that environmentally oriented policies have been integrated into the school's vision. The implementation of the Adiwiyata program involves all school elements and is integrated into the school-Based Curriculum (KTSP), the Annual Work Plan (RKT), and the School Activity and Budget Plan (RKAS). Furthermore, Aziza et al. (2022) examined the process of instilling an attitude of environmental concern, supporting and inhibiting factors, and the results of character education for environmental awareness in schools were examined. Integrated PKLH learning has fostered a sense of responsibility and love for nature. The character of environmental concern is formed through the school's vision and mission, socialization, Friday clean-up activities, educational sanctions, and the provision of environmentally friendly facilities. Although its contribution is lower than the cognitive aspect, these results indicate that PKLH learning has strong potential in shaping students' social and emotional sensitivity as part of meaningful learning. It is expected to encourage students to become agents of change in protecting and preserving the environment.

From the psychomotor aspect, it is apparent that although PKLH learning has provided opportunities for practical and real-life action, its implementation may not have been intensive enough in directly involving students in skill-based activities such as nursery projects, composting, hydroponics, and proper waste sorting. To maintain school cleanliness, students have been given equal responsibility and work together by utilizing the school environment as a place for learning, practice, and field observation. Environmental education at the school has succeeded in developing and increasing students' awareness and concern for the environment, even though the school, located at SMPN 1 Tinggimoncong, is surrounded by shady trees, making the area looks very green and natural.

Limitations in practical aspects should be noted as important considerations for the development of PKLH implementation in the future so that students' skill domains can also develop optimally. Environmental education in schools is very important for improving students' ecoliteracy. Population growth has triggered excessive exploitation of nature, which has a negative impact on the environment (Kazazoglu, 2025). Through a literature review, it was found that environmental education helps students understand the environment, the impacts of exploitation, and fosters awareness and ecoliteracy competencies as important preparations for addressing current environmental issues. Furthermore, Heryani et al. (2024) examined the sustainability of environmental awareness character building at SMKN Bintan Regency using quantitative descriptive methods. The results showed that social, economic, and ecological aspects played important roles. Participatory indicators were most prominent in the social aspect, career and skills development in the economic aspect, and knowledge of ecological principles in the ecological aspect was identified as the most dominant factor.

Based on the level of success in terms of knowledge, attitudes, and skills, there are still gaps and challenges. Environmental issues in schools are a crucial aspect of education that focuses not only on knowledge but also on students' attitudes and skills. Teachers act as facilitators connecting theory with practice, while students are expected to understand, internalize, and take concrete actions to protect the school environment. However, in practice, various challenges still arise in the cognitive, affective, and psychomotor domains. These challenges are closely related to how teachers design learning strategies and how students respond to them in their daily lives. To understand this situation, educational theory can be used as a reference to explain the gap between planning and implementation. Therefore, this discussion examines more deeply the challenges faced by teachers and students in fostering environmental awareness in schools.

The implementation of integrated learning in Population and Environmental Education (PKLH) has shown significant progress on the part of teachers; however, student achievement still requires serious attention to achieve optimal results. From a cognitive aspect, although teachers have demonstrated a deep understanding of PKLH concepts and environmental policies, students have not fully absorbed this information. This indicates a gap that needs to be addressed. Based on Piaget's constructivist theory, students' knowledge develops when they interact directly with their environment (Muflich & Nursikin, 2023). Teachers need to develop more effective teaching methods that connect theory with real-world practice, so that students can understand the objectives of environmental policies and the role of school infrastructure in supporting environmentally friendly practices. The lack of student understanding in this regard suggests that they may not yet realize the direct relevance of the learning they receive.

On the other hand, the affective aspect shows more balanced results, where PKLH learning successfully fosters positive attitudes and students' concern for the environment. However, challenges remain in appreciating students' contributions and encouraging

them to discuss the importance of environmental education. Teachers need to be more proactive in providing concrete examples of the use of environmentally friendly infrastructure, considering that students' direct involvement in environmental activities is crucial for developing a deeper sense of concern. According to Vygotsky, attitudes and values are formed through social interactions within a learning community (Moll, 1994). If students are not given the opportunity to engage in real-life activities with their peers, the internalization of values is weakened (Held & Mejeh, 2024; Jang et al., 2010). Some students may feel more engaged when given the opportunity to participate directly in activities, thus creating a more meaningful experience for them. As a result, students will benefit from active engagement with one another, which can improve their understanding and social skills (Jong et al., 2022; Lakkāla et al., 2021). For example, through programs such as keeping the classroom clean together. In this way, caring attitudes will be more easily instilled.

The psychomotor aspect shows the most striking gap, where students' practical skills in implementing environmentally friendly behavior are still low. The main challenge for teachers lies in the use of teaching methods that do not sufficiently emphasize direct experience and the limited provision of feedback on the skills demonstrated by students. In fact, skills are formed through repeated practice and direct experience (Haith & Krakauer, 2018). Students lack practical skills in using school environmental infrastructure, which highlights the need for interactive, experiential learning to encourage consistent engagement, as emphasized by Kolb's experiential learning cycle. In the Experiential Learning model, students learn from concrete experiences that involve thinking and doing, as the process focuses on individual learning experiences (Kolb, 1984). If students stop at the conceptual stage without much active experimentation, their skills will not develop optimally (Darling-Hammond et al., 2020). Therefore, learning needs to provide more opportunities for direct practice. Thus, students can learn from experience and build sustainable skills through project-based learning, experiments, and other practical activities that serve as effective solutions to improve their psychomotor abilities.

The challenges teachers still face, although relatively minor, demonstrate the need for a continuous process of reflection (Garrido, 2023). Reflection is described as teachers' efforts to evaluate and improve their teaching practices. Teachers who engage in reflection are able to identify which methods are effective and which still need adjustment. A project-based approach can serve as an alternative to increase student engagement (Almulla, 2020; Guo et al., 2020). This reflective process makes learning more adaptive and relevant to students' needs. Overall, the research findings confirm that teachers have demonstrated good performance, but students still face challenges in the cognitive, affective, and psychomotor aspects. Contextual Teaching and Learning (CTL) theory explains that learning becomes more meaningful when connected to real-life contexts (Yusyac et al., 2021). The implementation of well-structured learning strategies gradually reduces these challenges. Learning is no longer simply a transfer of knowledge, but rather a process of building sustainable attitudes and skills. Through teaching that addresses the cognitive, affective, and psychomotor domains in a balanced manner, schools prepare young people to be not only intelligent but also committed to protecting and caring for their surroundings. Ultimately, this strengthens a culture of environmental awareness within schools.

The concepts of sustainability, pollution, and conservation are key pillars of environmental education, which aims to foster environmentally friendly mindsets and behaviors. The PKLH learning program has been shown to positively impact students' knowledge, attitudes, and skills, reflected in their daily behaviors, such as disposing of waste properly, separating waste, and conserving electricity. Students also engage in practical activities such as tree planting and plastic waste management, which teach them the economic value of waste and the principles of recycling. Although many students demonstrate positive behaviors, their consistency varies, influenced by family background and environmental support. Therefore, the successful implementation of these concepts requires a comprehensive approach involving schools, families, and communities to create a strong environmental culture and ensure that environmentally friendly behaviors become part of students' sustainable lifestyles.

Conclusion

Based on the analysis, integrated Population and Environmental Education (PKLH) learning has proven effective in improving students' ecological knowledge, attitudes, and skills. In the cognitive domain, students demonstrated a stronger understanding of environmental issues such as sustainability, pollution, and conservation through the connection of learning materials to real-life contexts. In the affective domain, PKLH learning succeeded in fostering awareness, social responsibility, and environmental concern, although the consistency of internalization of values still varied. Meanwhile, in the psychomotor domain, students demonstrated initial abilities in implementing environmentally friendly behavior, but practical skills

did not develop optimally due to limited experiential activities and direct involvement. This study also revealed that the implementation of PKLH faces several challenges, particularly low environmental literacy, a learning model that is not fully contextualized, and limited opportunities for ecological practice in schools. External factors such as facilities, stakeholder engagement, and community support also influence the program's success. These findings highlight the need for a consistent project-based strategy and experiential learning, so that students' skills develop along with their knowledge and attitudes. Overall, the integration of PKLH has strong potential to strengthen a culture of sustainable education, create an environmentally conscious school environment, and encourage students to become agents of change in environmental conservation. Therefore, schools need to expand training for all school members, provide environmentally-based facilities, and develop contextual learning that emphasizes sustainability on an ongoing basis, so that education goes beyond knowledge transfer to produce real behavioral changes.

Acknowledgment
The authors would like to express their gratitude to the principal, teachers, and students of SMP Negeri 1 Tinggi Moncong for their cooperation and permission to conduct this research. The support and opportunities provided by the university and colleagues were invaluable in the preparation of this article. The authors also appreciate the constructive feedback and technical assistance that enriched the results of this research, enabling the smooth and successful completion of the study.

Author Contribution
This article was written by four authors, namely A and H. All authors carried out each stage of the research together.

Funding
This research did not receive external funding.

Conflict of Interest
The authors declare no conflict of interest.

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