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Improving Environmental Awareness: A Study of Integration in IPAS Education at SD Alam Lampung

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ABSTRACT

Learning activities designed to foster environmental awareness among elementary school students remain considerably limited. This study aims to improve students' environmental awareness through the integration of environmental education in Natural and Social Sciences (IPAS) learning at SD Alam Lampung with the Project-Based Learning (PjBL) approach. The research method used is descriptive qualitative, with data collection through interviews, observations, and documentation. The results of the study indicate that the application of PjBL in IPAS learning can improve students' understanding, attitudes, and actions towards environmental issues. Students not only gain theoretical knowledge, but are also involved in environmental projects that encourage them to play an active role in maintaining the sustainability of nature. PjBL has been proven effective in fostering pro-environmental attitudes, which is very important in forming a generation that cares about the environment. This study contributes to the development of a project-based learning approach that can improve students' awareness and responsibility towards the environment.

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1. INTRODUCTION

Indonesia is one of eight countries in Asia recorded as having the highest levels of pollution, with plastic waste being one of the major contributors (Hermawan & Astuti, 2021; Chandra et al., 2023). According to a World Bank report, Indonesia is estimated to produce around 7.8 tons of plastic waste annually. Of that amount, approximately 4.9 tons are mismanaged — meaning they are not collected, disposed of in inadequate landfills, or leaked from formal waste management systems (World Bank, 2021; Riza & Sumarti, 2023). This condition contributes to soil, water, and marine pollution, which adversely affects ecosystems and human health (Akbar & Maghfira, 2023; Ayuni, et al., 2024). Plastic waste that leaks into the environment often ends up in rivers and oceans, posing serious threats to marine life and

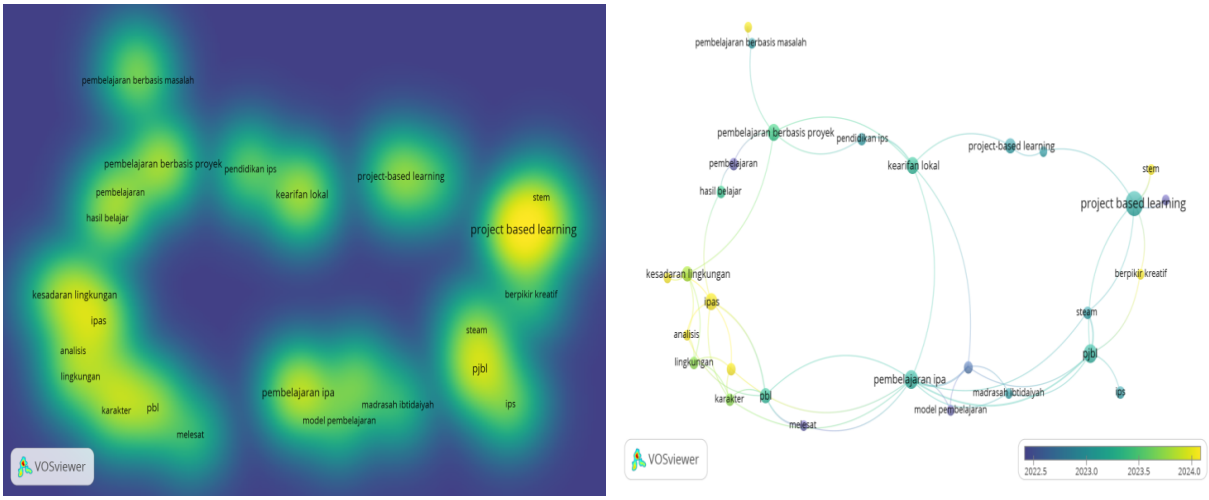
exacerbating the microplastic crisis that can enter the human food chain (Jambeck et al., 2015; C. M. Rochman et al., 2019; Nizar et al., 2025). Therefore, integrating environmental awareness into school curricula, particularly at the elementary level, becomes a crucial alternative to foster environmental consciousness.

However, the integration of environmental awareness remains suboptimal. Various literature analyses show that environmental awareness in schools is still very limited. A study by Azrai et al. (2024), found no significant difference in environmental awareness scores between students who had received environmental education and those who had not. This finding indicates that the existing environmental education integration still has limitations that need to be addressed. As a result, students' behavior toward the environment remains far from ideal. Many students still litter, fail to flush toilets, vandalize school property, damage plants, and waste water (Narut & Nardi, 2019). One of the main causes of this phenomenon is the low level of student concern for the environment. The lack of children's understanding of current environmental conditions is an urgent issue that requires immediate attention (Nugroho, 2022). Additionally, limited resources and infrastructure often become obstacles in implementing effective environmental education programs (Kusdiah et al., 2024).

To address this issue, environmental education needs to be optimized not only to build cognitive understanding but also to develop students' skills and sense of responsibility in preserving and improving environmental quality (Zahrah et al., 2024; Agustina et al., 2024). The integration of environmental education into Natural and Social Sciences (IPAS) learning at the elementary level can serve as an effective strategy for fostering environmentally friendly attitudes and behaviors from an early age (Kil, 2016). IPAS learning in elementary schools has great potential in instilling ecological understanding among students. As a subject that explores the interconnections between humans and the environment, IPAS can act as a platform to build environmental awareness and responsibility (Suhelayanti et al., 2023; Ramadhani & Andriani, 2024).

In the literature, enhancing environmental awareness through education has been the focus of various studies. Educational institutions play a critical role in increasing students' awareness of environmentally friendly practices (Djirong et al., 2024). Integrating environmental education into the curriculum serves as an effective method to raise students' environmental awareness (Hawa et al., 2021; Bianchi et al., 2022). Borhan and Ismail, as cited in Susilawati et al. (2017), investigated how students' attitudes and behaviors toward the environment changed after implementing project-based learning. The results show that Project-Based Learning (PjBL) is effective in enhancing students' environmental awareness and concern. This aligns with the findings of Putri et al. (2023), who discovered that PjBL also positively impacts environmental awareness at the university level. Although many studies have discussed the effectiveness of PjBL among university students, more research is needed to examine how this method can shape pro-environmental behavior, especially in elementary school-aged children. Ashari et al. (2023) and Steven et al. (2024) emphasized that environmental education must be interdisciplinary, enabling students to understand the interconnections among environmental, social, and economic systems.

Although environmental education has been widely discussed, few studies have specifically explored its integration through IPAS learning using a project-based approach. Bibliometric analysis results show that the topic of "project-based learning" (PjBL) has been one of the dominant and frequently researched themes over time, as illustrated in Figure 1 below.



(a) Density Visualization (b) Overlay Visualization

Figure 1. Density and overlay visualization of research on Project-Based Learning (PjBL) based on bibliometric analysis using VOSviewer.

Figure 1 illustrates that the integration of environmental education into IPAS (Natural and Social Sciences) learning through Project-Based Learning (PjBL) is highly relevant to the enhancement of environmental awareness. PjBL appears at the center of focus, closely connected to terms such as "*environmental awareness,*" "*science education*," and "*character.*" These connections indicate that the PjBL method is effective in embedding environmental issues into IPAS learning by leveraging experience-based approaches to build students' understanding of ecological issues. Its linkage with "local wisdom" also underscores the importance of relating learning to local cultural contexts, which is highly relevant to SD Alam Lampung.

The novelty of this trend is reflected in the dominance of colors representing the 2022–2024 period, signaling recent developments in project-based education and environmental awareness research. This approach is particularly well-suited for SD Alam Lampung, which supports nature-based experiential learning. Through PjBL, students can develop projects related to local environmental issues, such as waste management, to enhance their understanding and concern for the environment. Thus, PjBL emerges as a relevant learning strategy to foster environmental awareness from an early age.

This study aims to describe how the integration of IPAS learning can improve students' environmental awareness at SD Alam Lampung. The researcher also seeks to examine how students' environmental awareness increases not only in terms of knowledge, but also in their attitudes and actions toward the environment. The urgency of this research lies in the

pressing need to nurture a young generation that is curious and concerned about environmental issues. By leveraging the potential of nature-based learning at SD Alam Lampung, this research has the potential to contribute new insights into developing effective learning approaches to improve environmental awareness in elementary school students.

2. METHODS

2.1 Research Design

This study employed a qualitative method with a descriptive approach aimed at understanding how the integration of IPAS (Natural and Social Sciences) learning can enhance students' environmental awareness at SD Alam Lampung. Qualitative research is intended to describe and analyze phenomena, events, social activities, attitudes, beliefs, perceptions, and thoughts both individually and in groups (Sari, 2022). In qualitative research, sampling is adapted to the objectives and characteristics of the study. A purposive sampling technique was used to select research subjects. The study was conducted at SD Alam Lampung in Way Huwi Subdistrict, South Lampung, based on the consideration that the school implements an environmental-based education concept, aligning with the research objective: to describe how IPAS learning integration can enhance students' environmental awareness. In qualitative research, the researcher is directly present in the field to obtain accurate data.

2.2 Data Sources

This study involved 14 informants to obtain reliable and comprehensive information, with characteristics shown in Table 1.

Table 1. Informant Characteristics

Informant	Total	Age	Gender		Role in Research
			Lk	Pr	
Principal	1	40-45	1		Provides policies and school perspectives on environmental education
Curriculum Vice Principal	1	38-45		1	Explains integration of environmental education in the school curriculum
Teachers	2	30-35		2	Implements project-based learning methods related to the environment
Students	10	9-10	5	5	Participate in and experience environmental-based learning processes
Total	14	-	6	8	

2.3 Data Collection

Data were collected through interviews, observations, and documentation from 15 informants, namely the principal, curriculum vice principal, fourth-grade teachers, and fourth-grade students. Informants participated in structured interviews lasting 25–40 minutes. The data collection process followed four stages: data collection, data reduction, data presentation, and conclusion drawing and verification. These stages are illustrated in Figure 2 below.

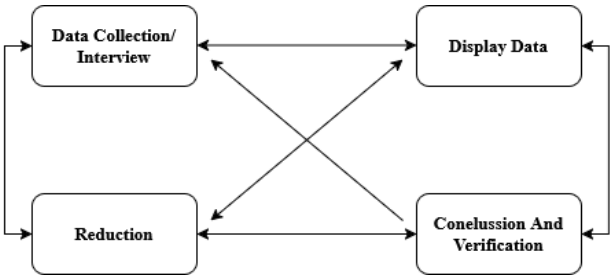


Figure 2. Miles and Huberman's Data Collection Process

2.4 Data Analysis

Data analysis in this study involved various documents relevant to the integration of environmental education in IPAS learning at SD Alam Lampung. These documents were collected to strengthen the interview findings. All interviews were transcribed, coded, compared, and analyzed to comprehensively describe the research findings. To ensure data validity and reliability, source triangulation was conducted as explained by Mekarisce (2020) and Alfansyur & Mariyani (2020). Additionally, the researcher regularly explained the findings to refine the analysis and classify emerging possibilities throughout the research process.

3. RESULTS AND DISCUSSION

This study aims to increase students' environmental awareness through the integration of environmental education into Natural and Social Science (IPAS) learning at SD Alam Lampung using the Project-Based Learning (PjBL) approach. Based on data obtained through interviews, observations, and documentation, it was found that the implementation of PjBL in IPAS learning significantly enhanced students' environmental awareness. To measure the success of environmental education integration into IPAS learning through PjBL, the researcher used three indicators of environmental awareness: understanding, attitude, and action (Nugroho, 2022).

3.1 Students' Environmental Understanding

Understanding the environment is a foundational element in fostering strong ecological awareness among students. In the educational context, this understanding not only involves theoretical knowledge about environmental issues but also awareness of the close

relationship between humans and their surroundings. The integration of environmental education into IPAS learning at SD Alam Lampung through PjBL has enhanced students' understanding of the environmental challenges they face.

Based on interviews with the homeroom teacher of Grade IV A, SD Alam Lampung has made various efforts to instill environmental awareness, such as supporting activities conducted weekly. According to the teacher, integrating environmental education into IPAS learning also contributes to students' understanding of environmental issues such as waste management, reforestation, and the impact of human activities on environmental degradation. This shows that learning processes involving real-life environmental issues offer more applicable and contextual understanding. According to the principal:

> *"Students at SD Alam must care about their environment and be responsible for what's around them. This also includes their social life." (P)*

This statement suggests that all students at SD Alam Lampung are expected to genuinely care for the environment, not just in theory but in response to real challenges. This view is reinforced by the Curriculum Vice Principal:

> *"The concept of environmental education integrated into IPAS aims to create a more comfortable learning environment and foster students' environmental awareness as an effort to preserve and protect the environment." (CVP)*

Moreover, an interview with a teacher (G2) emphasized the importance of a project-based approach to improve students' understanding of environmental issues. The teacher explained that environmental issues are embedded into learning by linking them with real-life events and phenomena. PjBL has already been implemented at the kindergarten level, but with different strategies and stages compared to elementary students.

SD Alam Lampung regularly organizes a monthly "science fair" that allows students to showcase their project outcomes. In this activity, students present the steps of their scientific projects. The results vary depending on students' interests. A teacher stated:

> *"...Each student is different, depending on what they enjoy. The teacher just guides and coordinates with the parents. The final result must include a simple report, from introduction and background to conclusions." (G2)*

This statement shows that teacher support and parental involvement are also necessary in PjBL. Beyond introducing students to environmental issues, project-based learning allows them to gain deeper understanding through direct experiences. Students are taught to identify environmental problems, plan projects, and evaluate outcomes.

According to literature, such learning—which combines theory and experience—is more effective in deepening students' understanding of environmental issues (Hawa et al., 2021). Thus, this research reveals that integrating environmental education into IPAS through PjBL is highly effective in deepening students' understanding of environmental issues. Project-based learning allows students to link theoretical knowledge with real-world environmental

problem-solving, thereby enriching their comprehension of sustainability. The classroom learning process as implemented during the study is illustrated in Figure 3.

Figure 3. Classroom Learning Process

Figure 3 illustrates the classroom learning process as implemented during the study. This process encompasses the sequence of instructional activities, interactions between teachers and students, and the integration of learning materials designed to facilitate student engagement and understanding throughout the lesson.

3.2 Environmental Attitude

There was a positive change in students' environmental attitudes after participating in environmental-based projects. Students became more aware of the importance of cleanliness and caring for their surroundings. They showed greater interest in eco-friendly activities such as cleaning the school area and joining recycling programs. These attitudes reflect internalized environmental values shaped by project-based learning. Interview results with students revealed increased awareness:

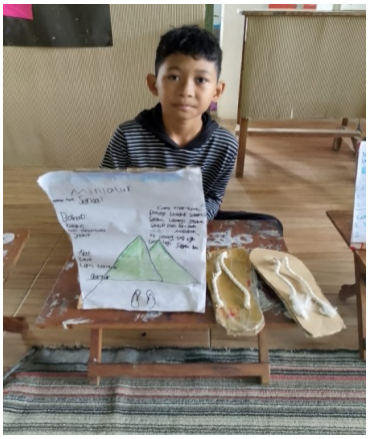
> *"I always throw trash in the bin, plant trees, bring my own containers to reduce plastic waste, and take care of the plants." (S1)*
>
> *"I feel more responsible for keeping the school clean. Now I often throw garbage in the right place and avoid damaging plants." (S3)*
>
> *"I feel happy seeing the flowers we planted grow well. It makes me realize how important it is to take care of nature." (S4)*

These statements show increased student awareness and concern for cleanliness and environmental sustainability.

Teachers also observed that through project-based environmental activities, students not only learned theory but also felt the real impact of their pro-environmental actions. One teacher said:

"Through these projects, students don't just learn in theory. They really feel it. They become more responsible for protecting the environment because they are directly involved." (G1)

Based on the teacher's interview, activities should start from small-scale environments. Students were introduced to waste sorting and tasked with bringing recyclable household waste. Later, they were asked to create individual projects using those materials, helping them understand how waste can be reused or repurposed. The PjBL product outcomes created by students from SD Alam Lampung during the project implementation are illustrated in Figure 3.



a. Recycled into sandals

b. Plastic chips as a sand substitute

Figure 3. PjBL Product Outcomes from SD Alam Lampung

Observation results confirmed a substantial change in students' environmental attitudes after engaging in project-based activities. Students became more caring about school cleanliness, plant maintenance, and actively participated in greening and waste management activities. This reflects stronger environmental concern, which—according to Oktarina et al. (2023)—is greatly influenced by direct environmental experiences. Project-based education connects students with real-world environmental activities, encouraging them to experience the positive impacts of their pro-environmental behaviors. This finding also supports research by Kusdiah et al. (2024), which showed that project-based approaches can effectively encourage students' attitudinal change toward environmental sustainability.

3.3. Students' Environmental Actions

Environmental actions are a tangible reflection of students' understanding and attitudes toward the environment, which are fostered through environment-based learning. In this study, students' actions were measured based on their participation in real-life activities that support environmental conservation, such as tree planting, waste management, and other eco-friendly practices. The Project-Based Learning (PjBL) approach

implemented in the Natural and Social Sciences (IPAS) subject at SD Alam Lampung proved effective in facilitating these changes.

One of the nature-based projects carried out by the students involved processing butterfly pea flowers (*Clitoria ternatea*) into useful products such as butterfly pea tea, fritters made with butterfly pea, and handicrafts (eco-print). In addition, students were also directly involved in gardening activities, including planting and harvesting butterfly pea flowers. These activities began with planting butterfly pea around the school as part of a reforestation and eco-friendly plant management project.

Students participated in every stage of the process, from planting seeds to caring for the plants. During the harvesting phase, they learned how to properly pick the flowers and process them into usable products such as herbal teas or handicrafts. This gardening project not only provided knowledge about plant care but also instilled important values such as environmental responsibility and sustainability. As one student expressed:

> *"Every Friday, we go to the experimental garden to plant. There are butterfly pea flowers, chili, lemongrass, lettuce, pak choi, and eggplants. It's fun because we get to see nature and do hands-on practice." (S5)*

Based on interview results, one of the teachers stated that in the *Sekolah Alam* (nature-based school), environmental education is a primary focus, as the school aims to increase awareness about the importance of preserving natural resources in the surrounding environment. The teacher explained:

> *"The main theme in Sekolah Alam is the biodiversity of Lampung. There are themes such as herbal plants, which highlight the biodiversity in Lampung, like butterfly pea, lemongrass, turmeric, and others. These themes are frequently raised as they align with environmental education and aim to promote care, maintenance, and conservation." (G1)*

The following figures 4 document the students' activities during the PjBL project with a biodiversity theme.

Figure 4. Students at SD Alam Lampung planting and harvesting butterfly pea flowers as part of an environmental sustainability project.

Figure 5. Student projects processing butterfly pea flowers into herbal drinks, food, and handicrafts as efforts to support environmental sustainability.

Beyond changes in knowledge and attitude, students' environmental actions clearly improved after their involvement in environmental projects. Students engaged in activities focused on environmental management, such as planting and harvesting butterfly pea, processing harvests into useful products, and participating in school cleaning and waste recycling. This active involvement demonstrates that students not only understand the importance of environmental sustainability but also apply their knowledge through real actions that impact their surroundings. This reinforces the notion that environmental care is fostered not only through knowledge and attitudes but also through direct engagement in activities that improve environmental conditions (Sawitri et al., 2024). Practical learning experiences, such as gardening and reforestation, encourage students to apply their knowledge in daily life (Marlina et al., 2024).

Overall, the integration of environmental education into IPAS learning at SD Alam Lampung has had a profound impact on shaping students' attitudes and behaviors toward the environment. Through nature-based and project-based learning, students not only gain a deeper understanding of environmental awareness but are also provided with opportunities to contribute directly to environmental sustainability through real actions. These findings align with Zahrah et al. (2024), who stated that environmental-based learning that integrates theory and practice can enhance environmental awareness and the overall quality of education. Ramadhani & Andriani (2024) also emphasized that project-based learning offers

students the opportunity to explore environmental issues in depth, which is highly relevant to developing a generation that cares about sustainability.

4. Conclusion

This study reveals that the integration of environmental education into IPAS learning using the Project-Based Learning (PjBL) approach is highly effective in enhancing students' knowledge, attitudes, and pro-environmental actions at SD Alam Lampung. Project-based learning provides students with opportunities to learn directly and engage in real-life actions that contribute to environmental sustainability. Through environment-based projects, students not only acquire knowledge but also experience positive changes in their attitudes and behaviors toward the environment. This approach demonstrates that integrating environmental education into the IPAS curriculum can be an effective tool in cultivating a generation that is concerned with environmental sustainability. These findings support the existing literature indicating that experiential learning enhances environmental awareness and supports the development of pro-environmental attitudes and behaviors.

5. REFERENSI

Agustina, H. W., Halimah, L., & Miranti, N. I. A. (2024). Analisis Upaya Sekolah Dalam Membentuk Karakter Peduli Lingkungan Pada Peserta Didik Melalui Program Adiwiyata. *Jurnal Pedagogik Pendidikan Dasar*, *11*(1), 18–30. https://doi.org/10.17509/jppd.v11i1.66285

Akbar, M., & Maghfira, A. (2023). Pengaruh Sampah Plastik Dalam Pencemaran Air Laut Di Kota Makassar. *Riset Sains Dan Teknologi Kelautan*, *6*(1), 25–29. https://doi.org/10.62012/sensistek.v6i1.24234

Ayuni, R. S., Putri, S., Purnama, S. R., & Giwangsa, S. F. (2024). Problem Based Learning Model in Natural Science Learning in Elementary Schools: Systematic Literature Review & Bibliometric Analysis. *Widyagogik: Jurnal Pendidikan dan Pembelajaran Sekolah Dasar*, *12*(2), 138-153.

Azrai, E. P., Heryanti, E., Ramadhani, V., Ilyas, M., Education, B., Science, N., & Jakarta, U. N. (2024). *Biosfer : Jurnal Pendidikan Biologi*. *17*(2), 317–325.

Bianchi, G., Testa, F., Boiral, O., & Iraldo, F. (2022). Organizational Learning for Environmental Sustainability: Internalizing Lifecycle Management. *Organization and Environment*, *35*(1), 103–129. https://doi.org/10.1177/1086026621998744

Chandra, M., Nyanasuryanadi, P., Burmansah, B., Khiong, T. K., & Surya, J. (2023). How does education and mindfulness matter to high school student's pro-environmental behaviour? *Jurnal Konseling Dan Pendidikan*, *11*(3), 152. https://doi.org/10.29210/199500

Djirong, A., Jayadi, K., Abduh, A., Mutolib, A., Mustofa, R. F., & Rahmat, A. (2024). Assessment of Student Awareness and Application of Eco-Friendly Curriculum and Technologies in Indonesian Higher Education for Supporting Sustainable Development Goals (SDGs): A Case Study on Environmental Challenges. *Indonesian Journal of Science and Technology*, *9*(3), 657–678. https://doi.org/10.17509/ijost.v9i3.74385

Hawa, N. N., Zakaria, S. Z. S., Razman, M. R., & Majid, N. A. (2021). Geography education for promoting sustainability in Indonesia. *Sustainability (Switzerland)*, *13*(8), 1–15. https://doi.org/10.3390/su13084340

Hermawan, S., & Astuti, W. (2021). The Penta Helix Model Utilization as Integrative Action for Combating Marine Plastic Litter in Indonesia. *Bina Hukum Lingkungan*, *5*(2), 237–261.

Jambeck, J. R., Roland, G., Wilcox, C., Siegler, T. R., Perryman, M., Andrady, A., Narayan, R., & Law, K. L. (2015). Marine pollution. Plastic waste inputs from land intothe ocean. *Science*, *347*(6223), 764–768.

Khakim Ashari, M., Faizin, M., Yudi, U., Aziz, Y., & Irhami Universitas Islam Negeri Sunan Ampel Surabaya, H. (2023). Konstruksi Pembelajaran Pendidikan Agama Islam Interdisipliner dalam Menanamkan Sikap Religius Peserta Didik. *Jurnal Agama Sosial Dan Budaya*, *6*(2), 114. https://doi.org/10.31538/almada.v6i2.3313

Kil, N. (2016). Effects of vicarious experiences of nature, environmental attitudes, and outdoor recreation benefits on support for increased funding allocations. *The Journal of Environmental Education*, *47*(3), 222-236.

Kusdiah, Y., Sriwati, M., Kasnawati, & Sampe, R. (2024). Peran Pendidikan Lingkungan Dalam Meningkatkan Kesadaran Masyarakat Tentang Pengelolaan Sampah. *Jurnal Review Pendidikan Dan Pengajaran*, *7*(3), 7415–7421.

Narut, Y. F., & Nardi, M. (2019). Analisis Sikap Peduli Lingkungan Pada Siswa Kelas VI Sekolah Dasar di Kota Ruteng. *Scholaria: Jurnal Pendidikan Dan Kebudayaan*, *9*(3), 259–266. https://doi.org/10.24246/j.js.2019.v9.i3.p259-266

Nizar, M., Putra, A., Zahrani, N. A., Zahra, T. A., Bella, B. C., Hariyadi, A. G., Fadhila, D. S., Akrom, S., Abiyyu, A., Rini, R., & Firdausi, K. (2025). *Sampah Plastik sebagai Ancaman terhadap Lingkungan Universitas Muhammadiyah Surakarta , Indonesia*. *di*.

Nugroho, M. A. (2022). Konsep Pendidikan Lingkungan Hidup Sebagai Upaya Penanaman Kesadaran Lingkungan Pada Kelas Iv Min 1 Jombang. *Ibtidaiyyah: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *1*(2), 16–31. https://doi.org/10.18860/ijpgmi.v1i2.1691

Nugroho, M. A. (2022). Konsep pendidikan lingkungan hidup: Upaya penenaman kesadaran lingkungan. *Ibtidaiyyah: Jurnal Pendidikan Guru Madrasah Ibtidaiyah*, *1*(2), 93-108.

Marlina, M., Daffa, I. S., Nina, N., Haris, H., & Salmawati, S. (2024). Integrasi Pendidikan Lingkungan dalam Pembelajaran Sains untuk Mengembangkan Kesadaran Ekologis pada Siswa Sekolah Dasar. *Jurnal Sultra Elementary School*, *5*(1), 54-69.

Oktariana, D., & Rigianti, H. A. (2023). Pembentukan karakter peduli lingkungan pada siswa melalui program kampus mengajar angkatan 5 di SD Muhammadiyah Sambeng. *Didaktik: Jurnal Ilmiah PGSD STKIP Subang*, *9*(3), 1603-1612.

Putri, A. A. P. P., Rahardjo, B., & Olby, N. A. (2023). The Project-Based Learning Model Improves Ability to Understand Environmental Cleanliness in Early Childhood. *Jurnal Pendidikan Anak Usia Dini Undiksha*, *11*(1), 43-51.

Ramadhani, A. A., & Andriani, A. E. (2024). Development of Interactive E-Module Based on Inquiry Learning to Enhance IPAS Learning Outcomes for Students Public Elementary School. *Jurnal Pijar Mipa*, *19*(2), 209–215. https://doi.org/10.29303/jpm.v19i2.6587

Riza, F., & Sumarti, D. (2023). Fostering Green Innovation and Environmental Consciousness: A Pathway to Competitive Advantage in the Green Economy. *Jurnal Ilmu Lingkungan*,

22(1), 193–204. https://doi.org/10.14710/jil.22.1.193-204

Rochman, C. M., Brookson, C., Bikker, J., Djuric, N., Earn, A., Bucci, K., Athey, S., Huntington, A., McIlwraith, H., Munno, K., Frond, H. De, Kolomijeca, A., Erdle, L., Grbic, J., Bayoumi, M., Borrelle, S. B., Wu, T., Santoro, S., Werbowski, L. M., … Hung, C. (2019). Rethinking microplastics as a diverse contaminant suite. *Environmental Toxicology and Chemistry*, *38*(4), 703–711. https://doi.org/10.1002/etc.4371.

Sari, I. N., Lestari, L. P., Kusuma, D. W., Mafulah, S., Brata, D. P. N., Iffah, J. D. N., ... & Sulistiana, D. (2022). *Metode penelitian kualitatif*. Unisma Press.

Sawitri, A. D., Priyanti, P. W., Wanah, N., & Prayogo, M. S. (2024). Membangun Generasi Peduli Lingkungan: Analisis Literatur Pembelajaran Sains di Tingkat SD/MI. *INKUIRI: Jurnal Pendidikan IPA*, *13*(1), 106-113.

Steven, K., Hartono, H., & Saearani, M. F. T. Bin. (2024). Paradigma dan Isu dalam Pendidikan Seni: Strategi Untuk Pengembangan Pendekatan yang Relevan dan Berkelanjutan. *Didaktika: Jurnal Kependidikan*, *13*(3), 3833–3846. https://www.jurnaldidaktika.org/contents/article/view/924

Suhelayanti, S., Syamsiah, Z., Rahmawati, I., Kunusa, W. R., Suleman, N., Nasbey, H., Tangio, J. S., Anzelina, D., & others. (2023). *Pembelajaran Ilmu Pengetahuan Alam dan Sosial (IPAS)*. Yayasan Kita Menulis.

Susilawati, A., Hernani, H., & Sinaga, P. (2017). the Application of Project-Based Learning Using Mind Maps To Improve Students' Environmental Attitudes Towards Waste Management in Junior High Schools. *International Journal of Education*, *9*(2), 120. https://doi.org/10.17509/ije.v9i2.5466

Zahrah, S., Susanto, T. T. D., Pratama, M. Z., Aisyah, J., & Kurniawan, A. (2024). Improving the Quality of Education Through Environmentally Based Learning. *Perspektif Ilmu Pendidikan*, *38*(1), 47–56. https://doi.org/10.21009/pip.381.5