Implementation of ESD (Education for Sustainable Development) in Natural and Social Sciences Learning in Elementary Schools

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Article History
accepted 1/8/2025 approved 1/9/2025 published 1/10/2025

Abstract
The purpose of this study is to analyze the implementation of ESD (Education for Sustainable Development) in fourth-grade science learning. The participating teachers are fourth-grade teachers who have more than 20 years of teaching experience. This study was conducted through observation and in-depth interviews. The research method used in this study is a qualitative approach using descriptive methods. Data collection techniques for qualitative research include observation, interviews, and documentation studies. This study focuses on the implementation of ESD in fourth-grade science learning, by exploring teachers' views and students' learning experiences. The results of this study can support the creation of teaching materials used.
Keywords: *ESD,* IPAS, Elementary school

Abstrak
Tujuan penelitian ini adalah untuk menganalisis penerapan ESD *(Education For Su Sustainable Development)* pada pembelajaran IPAS kelas 4. Guru yang menjadi partisipan adalah guru kelas 4 yang telah memiliki pengalaman mengajar lebih dari 20 tahun. Penelitian ini dilakukan dengan cara observasi dan wawancara mendalam. Metode penelitian yang digunakan dalam penelitian ini adalah pendekatan kualitatif dengan menggunakan metode deskriptif. Teknik pengumpulan data untuk penelitian kualitatif meliputi observasi, wawancara, dan studi dokumentasi. Penelitian ini berfokus pada penerapan ESD dalam pembelajaran IPAS di kelas 4, dengan menggali pandangan guru dan pengalaman belajar siswa. Hasil penelitian ini dapat mendukung dalam pembuatan perangkat ajar yang digunakan.
Kata kunci: *ESD,* IPAS, Sekolah Dasar

Social, Humanities, and Education Studies (SHEs): Conference Series p-ISSN 2620-9284
https://jurnal.uns.ac.id/shes e-ISSN 2620-9292

INTRODUCTION

The flooding problem has not subsided over time, but has instead increased in volume and spread significantly. This environmental damage has become a wake-up call for humanity, requiring citizens to be increasingly vigilant about nature, which is already sounding alarms in its own way (Praja, 2021). Environmental damage occurs due to a lack of public concern for the surrounding environment (Oktamarina, 2021).

Environmental issues are increasingly complex and demand the involvement of basic education to instill sustainable values. This educational approach is known as Education for Sustainable Development (ESD) (Purnamasari et al., 2022). Education for Sustainable Development (ESD) emphasizes the development of critical thinking, ethics, and concern for environmental issues from an early age (UNESCO, 2022). In Indonesia, the ESD concept has been promoted through various policies, including the national curriculum. However, its implementation remains very limited, particularly at the elementary school level (Merangin et al., 2018).

Education is the most strategic means of instilling and implementing development. This is seen in improvements in the economic sector, education, infrastructure, and sustainable development values. Development, in this case, is the development of students' thinking patterns as educational subjects prepared for future life, integrated with ESD (Latifah et al., 2018). To create a future generation that cares for and loves the environment, it is necessary to instill a caring character from an early age (Oktamarina, 2021).

The Natural and Social Sciences (IPAS) subject, part of the Independent Curriculum (Kurikulum Merdeka), offers a strategic opportunity to integrate ESD. The IPAS material covers topics such as the environment, social order, family economics, and human relationships with nature—all aligned with the principles of sustainability. Unfortunately, in practice, IPAS learning in many elementary schools remains fragmented and does not explicitly integrate ESD values fully. Teachers focus more on cognitive aspects or achieving material targets, while the formation of sustainable values and attitudes has not been a primary concern (R. Rahmawati et al., 2024).

The urgency of this research lies in the lack of empirical studies on how teachers integrate ESD values into science and science materials and activities. This research is crucial for mapping actual classroom practices. Examining implementation provides a basis for schools, education departments, and policymakers to formulate more systematic ESD strengthening strategies.

Most ESD studies in Indonesia still focus on the development of ESD-based media or learning modules, but few have qualitatively explored how ESD is implemented in the classroom, particularly in fourth-grade science lessons. This is precisely the age at which students begin to develop logical thinking skills and social awareness, making it strategic to instill sustainability values from an early age (Oktamarina, 2021).

Based on this background, this study aims to explore in-depth the implementation of ESD in science learning in fourth-grade elementary schools, by examining three dimensions of sustainability: environmental, social, and economic. This research is expected to provide a concrete picture of ESD practices in the classroom, the challenges faced by teachers, and students' attitudes toward sustainability values. The findings of this study are expected to serve as a foundation for improving sustainability education strategies at the elementary school level.

METHOD

. This study uses a qualitative descriptive method. The research location is a public elementary school in Ngadirojo District, Wonogiri Regency.The subjects in this study were grade 4 phase B at SDN 1 Ngadirojo Lor in the 2024/2025 academic year, as well as a teacher with more than 20 years of teaching experience. Data collection techniques in qualitative research include observation, interviews, and documentation

studies. Observations in this study were conducted during science lessons. Interviews using interview guidelines were conducted involving teachers and students regarding green moral awareness and the implementation of ESD. The documentation used includes: 1) Learning Modules ; 2) photo documentation.

The validity of the data in this study uses method and source triangulation. Method triangulation is carried out by comparing information or data in different ways, such as using interview methods, observation, and using different informants. This method will produce different evidence or results, which will then provide different views so that reliable truth is obtained. Meanwhile, source triangulation is carried out by checking data that has been obtained from various data sources such as interviews, documents, questionnaires and observations (Miles et al., 2014). The analysis technique used is interactive analysis (Miles et al., 2014). The data analysis process consists of data collection, data reduction, data presentation, and drawing conclusions (Sugiyono, 2015)

RESULTS AND DISCUSSION

1. Learning Outcomes and Textbooks in ESD implementation

The results of analyzing the Learning Outcomes in Phase B do not yet explicitly address ESD or ESD. This is because the CP is structured in a general manner and still requires refinement to the Learning Objectives.

ESD in the teacher's handbook already contains it, but implicitly. Teachers are required to develop its application. This is stated in the book, which states that "students will also learn about the process of photosynthesis and its relationship to other living things. From this understanding, students are expected to see the importance of plants for the survival of life on Earth and why humans need to protect them. In addition, students will learn about how plants reproduce and how plants disperse their seeds" (Amalia et al., 2020)

The ESD in the teacher's manual emphasizes the importance of preserving plants and animals. However, the student's textbook does not mention preserving the environment, plants, or animals (Fitri et al., 2023). Therefore, teachers need to engage students during the learning process.

In the teacher's guide, not all of the material covers ESD. It only covers plants, people in my area, and my area and its natural resources. To make things easier, see the following table:

Tabel 1. ESD Implementation

Aspect	ESD Implementation
Learning Outcomes	x
Teacher's Guidebook	V (implied)
Student Handbook	x

2. Implementation of the 3 Pillars of ESD

Based on interviews and observations, it was found that fourth-grade elementary school students' attitudes toward Education for Sustainable Development (ESD) values have begun to develop, particularly in the context of science and science learning activities. This behavior can be analyzed based on the three main pillars of ESD: environmental, social, and economic (Ruswendi et al., 2024).

a. Environmental Aspects

Environmental aspects are the easiest part of science lessons to teach. They often link lesson topics to habits like maintaining cleanliness, planting, recycling, and observing the natural environment. Teachers have implemented Environmental SD by encouraging students to plant, clean the environment, and turn off the water when not in use. However, this has not yet emerged from the heart due to a lack of understanding of the future impact.

25% of students enjoyed being taken outside the classroom to learn. They were very enthusiastic about the topic of plants and being invited outside to plant them. However, 75% of students disliked planting and caring for plants.

b. Social Aspects

Cooperation, mutual assistance, and caring for others are part of the social values we try to instill in our learning, for example, when creating projects or cleaning the park. We emphasize the importance of helping each other, reminding students if they litter. However, values such as social justice, empathy for vulnerable groups, or children's rights have not been systematically explored.

c. Economic Aspects

Teachers acknowledge that the economic aspects of sustainability have not yet become a primary focus in science lessons. They haven't yet linked the material to issues of energy conservation, wise consumption, or efficient resource utilization, but they haven't yet understood their impact on the future.

Students understand that it's okay to waste water or keep lights on all the time; they simply consider saving energy a good deed. Their understanding hasn't yet reached the point of economic reasons or resource sustainability.

3. Integration of ESD in the Pancasila Student Profile Strengthening Project

The independent curriculum integrates the P5 Project into learning. It is a series of activities that students must undertake within a specific theme prepared by the school. P5 is designed to train students to observe, solve problems, develop their talents and interests, and make informed decisions (Barokah et al., n.d.).

The Pancasila Student Profile Strengthening Project (P5) within the Independent Curriculum provides a highly relevant platform for integrating Education for Sustainable Development (ESD) values into learning activities. P5 emphasizes character development and 21st-century skills through contextual themes aligned with sustainability principles, such as sustainable lifestyles, local wisdom, and building the mind and body (Zaradiva et al., 2025).

Based on interviews and observations in 4th grade, teachers have begun integrating ESD principles into the implementation of P5, particularly around the themes of "Sustainable Lifestyle" and "Entrepreneurship." For example, in one P5 activity, students are invited to create works of art from recycled materials, which simultaneously teaches economic values (the economic pillar of ESD) and awareness of waste (the environmental pillar).

However, the integration between IPAS and P5 is still not optimal, because it requires a long time, the creation of a series between P5 and IPAS is not well structured. The guidebook is incomplete, and the socialization of P5 is unclear.

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4. Challenges of implementing ESD

The challenge in implementing ESD is that teachers do not fully understand the concept of ESD, especially in terms of its relationship to social and economic pillars. Teachers are more familiar with terms such as

"environmental conservation" than "sustainability education." This results in teachers' lack of understanding of the concept of ESD, which has a direct impact on how ESD is implemented in the classroom (Cahyani et al., 2024). This is in line with S. Rahmawati et al., (2021) stated that teachers do not yet understand the concept of sustainable development (ESD).

Limited textbooks and teaching modules that implement ESD. Schools only use textbooks from the Ministry of Education and Culture and worksheets (LKS). The student textbooks and worksheets do not explain ESD. However, the teacher's textbook implicitly contains ESD. Teachers are required to be creative in developing teaching materials that link to ESD. In line with (S. Rahmawati et al., 2021), teachers integrate ESD into learning and connect it with relevant content and appropriate methods. The role of teachers is to encourage school change in learning, and teachers are a determining factor in student learning success by creating a meaningful learning environment and student learning outcomes. This is due to the lack of a detailed curriculum related to ESD learning that has been established (Eliyawati et al., 2023).

Limited learning time. Teachers create lesson plans that are only linked to the classroom. Contextual learning would be more meaningful. Another student created crafts from used materials in class, but there wasn't enough time to continue at home. Consequently, contextual learning about the environment was not optimal in science (Firda et al., 2024).

Lack of support at home and in the community. Students' behavior at school sometimes doesn't continue at home. Families that aren't yet aware of the importance of sustainability can lead to inconsistent student habits.

Efforts to implement a sustainable environment are being made through the Adiwiyata program, an ESD-based learning program. The Ministry of National Education has launched an environmental education program packaged under the Adiwiyata Program (Pradini et al., 2019). However, not all schools have the Adiwiyata School program. On the other hand, some schools do not implement ESD-based learning.

Lack of government outreach, training, and professional support. Teachers have never received specific training on ESD implementation. They rely solely on the internet or personal experience. This contributes to the suboptimal implementation of ESD in schools. Teachers rarely, if ever, seek out references on ESD topics. The lack of seminars, training, or workshops on ESD for teachers is also an unavoidable factor (Salam & Hamdu, 2022).

Students' low awareness is evidenced by their lack of understanding of the future impact of their actions. This is in line with research by Ismail, (2021) which states a lack of awareness regarding maintaining a clean school environment.

CONCLUSION

The results of this study indicate that the implementation of Education for Sustainable Development (ESD) in 4th grade elementary school science learning has been carried out in a limited manner depending on the initiative and understanding of each teacher. Of the three main pillars of environmental, social, and economic ESD. The challenges for teachers in implementing ESD are: Limited understanding of ESD as a whole, the unavailability of teaching materials that explicitly integrate sustainability values only through P5 but the integration between Science and P5 is still not optimal. ; limited time support; Low student awareness; lack of training; lack of textbooks; lack of community support. In this regard, it is necessary to align ESD into student textbooks. Based on the findings and limitations in this study, it is hoped that it can be used as a reference in creating modules, textbooks, and teaching tools.

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