

## Education for Sustainable Development (ESD) in Elementary Education: Enhancing Educational Quality through Local Practices in Kalimantan

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Education for Sustainable Development (ESD) has become a strategic agenda in global education, requiring schools to cultivate not only knowledge but also values, habits, and action competence for sustainability. In Indonesia, this agenda has strong entry points through the Adiwiyata framework and the Kurikulum Merdeka (including P5), yet implementation often varies and is frequently reduced to partial, activity-based efforts rather than whole-school transformation. A key problem is the implementation gap: sustainability routines may exist, but institutional alignment, time, and support systems can be insufficient to sustain consistent practice. This study addresses that gap by examining SDN 1 Sanggu (Kalimantan) to identify how ESD is practiced in daily school life, what constrains it, and what feasible strengthening strategies can be applied.

This research contributes an empirically grounded, context-specific account of ESD practice and constraints in a non-urban elementary school setting. It also proposes low-burden institutionalization options aligned with whole-school ESD principles. A qualitative case study design was used at SDN 1 Sanggu, Kalimantan, with data collected in October–November 2025. Data were gathered through observations of classroom learning, projects, and school habits; semi-structured interviews with the principal, teachers, homeroom teacher, and committee/parents; FGDs with teacher and student groups; and documentation review (curriculum materials, teaching modules, school programs, and student artifacts).

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Results show that school actors frame ESD as education beyond grades that builds care, clean living, frugality, and social coexistence. ESD is supported by active, hands-on pedagogy and daily routines such as class cleanliness duties and energy-saving reminders. However, ESD is still largely informal habituation rather than a structured written program, making consistency vulnerable. Major barriers include administrative workload, limited time, teacher fatigue, and infrastructure constraints that reduce innovation continuity. Sustainability behaviors such as waste sorting tend to revert without reinforcement; participants therefore recommend shared “three habits” rules and light monitoring (e.g., class points) supported by aligned teachers and clear scheduling. In conclusion, SDN 1 Sanggu appears pedagogically “ESD-ready,” but requires light institutional supports to stabilize routines and behavior change.

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## I. Introduction

Education for Sustainable Development (ESD) has become a strategic agenda in global education because it positions schools not only as places to transfer knowledge, but also as ecosystems that shape values, habits, and collective action for sustainability (Oe et al., 2022a). In the SDG framework, Target 4.7 explicitly mandates that by 2030 all learners should acquire knowledge and skills to promote sustainable development (including sustainable lifestyles, human rights, gender equality, peace, and global citizenship) (Hopkins & Kohl, 2019; Oe et al., 2022b). UNESCO reinforces this mandate through the ESD for 2030 Roadmap and the Berlin Declaration, emphasizing transformation in learning systems and the preparation of teachers and institutions to nurture learners as change makers (Glavič, 2020). In practice, ESD requires integration of cognitive learning (understanding issues), socio-emotional learning (care, empathy, responsibility), and action competence (real decision-making and behavior change), which typically demands consistent learning design and supportive school culture rather than one-off activities.

However, a persistent problem across many contexts is the implementation gap ESD is frequently interpreted narrowly as environmental cleanliness campaigns or extracurricular projects (Glas et al., 2025), while the intended “whole school” transformation (policy, curriculum, pedagogy, routines, partnerships) remains partial. Studies on ESD implementation highlight recurring obstacles: limited teacher readiness, weak institutional alignment, time constraints, and uneven support systems that make sustainability initiatives hard to sustain (Gba & Yıldız, 2025; Mohamed & El-Menawy, 2025). The literature also shows that sustainability education is more effective when schools adopt a whole-school approach, connecting classroom learning with governance, community engagement, facilities management, and student participation. Therefore, the solution pathway most often recommended is not “adding a new subject,” but strengthening school-level systems: (1) embedding sustainability themes into learning and assessment, (2) using active and inquiry-based pedagogy, (3) standardizing routines and norms, and (4) building leadership and teamwork mechanisms that protect teacher capacity.

In Indonesia, ESD has a strong policy entry point through the Adiwiyata program (and related regulations on environmentally cultured schools), which promotes school-wide environmental governance (Krasteva-Hristova et al., 2025), participation, and sustainable facilities. At the curriculum level, Kurikulum Merdeka provides a concrete channel through *Projek Penguatan Profil Pelajar Pancasila* (P5), where themes and competencies can be aligned with sustainability and community-based projects (Akrivou et al., 2025; Al-Ismaily et al., 2025). Yet research on Indonesian elementary schools indicates that implementation still varies widely: some schools develop strong learning culture and infrastructure, while others struggle with consistency, teacher workload, and limited resources, especially outside major urban centers. This suggests that understanding ESD in Indonesia requires close attention to “how it actually works” inside the daily rhythms of schools, including informal routines that may not appear in formal documents.

Empirical studies provide useful foundations but also reveal a gap relevant to this research (Zhang et al., 2025). For example, Indonesian studies have documented ESD and sustainability practices in selected elementary schools (e.g., pilot schools in Surabaya), showing that environmental activities are often strongest, while social-economic dimensions and institutionalization mechanisms need reinforcement. Other studies focus on Adiwiyata implementation outcomes (literacy, environmental literacy, program evaluation, and pedagogical models such as PBL) (Hübschke et al., 2025), confirming benefits but also pointing to sustainability challenges when routines are not consistently supported across classes and stakeholders. Research on behavior change (including waste sorting interventions) further indicates that sustained habits usually require clear cues, consistent monitoring, and shared norms, which aligns with whole-school thinking. ESD case studies in Kalimantan, particularly in smaller public elementary schools, remain limited, while local context

(resources, geography, community patterns, and school capacity) can decisively shape what is feasible and sustainable.

This study addresses that gap by examining SDN 1 Sanggu (Kalimantan) as a qualitative case study, focusing on practices and challenges of ESD as they appear in real teaching and school culture. The draft evidence indicates that school actors already frame ESD as value-oriented education beyond academic scores, emphasizing care, clean living, frugality, and social coexistence and they associate ESD with active, hands-on pedagogy where students practice, discuss, and solve problems rather than passively listen. At the same time, ESD routines are described as informal habituation rather than a formally structured written program and key challenges include teacher administrative burden, time constraints, fatigue, and limited infrastructure. A school-habit example also shows that waste sorting and other sustainability behaviors are not yet stable without continuous adult reinforcement, motivating the need for common rules and light monitoring. Importantly, while SDN 1 Sanggu has been studied in other themes such as manipulative learning media and teacher well-being leadership, a dedicated ESD-focused study integrating classroom practice and whole-school culture has not been foregrounded.

The contribution of the research is to provide an empirically grounded and context-specific explanation of (1) how ESD is practiced through learning, projects, and school routines at SDN 1 Sanggu, (2) what structural and cultural challenges constrain sustainability efforts, and (3) what feasible school-level strategies can strengthen consistency and institutionalization in a Kalimantan elementary school context, aligned with whole-school ESD principles. Accordingly, this paper is structured as follows: Section 2 presents the method, Section 3 presents results and discussion, and Section 4 concludes with implications and recommendations.

## II. Method

### Research Design

This study uses a qualitative approach with a case study design to understand in depth the practices and challenges of *Education for Sustainable Development* (ESD) in the real context of schools.

### Research Location and Time

The research was carried out at 1 Sanggu State Elementary School, Kalimantan. The data collection time was carried out in October 2025–November 2025, covering phases: (1) pre-field, (2) field data collection, (3) analysis and verification of findings.

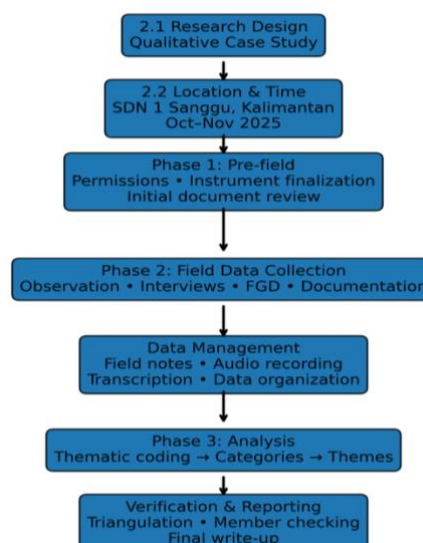


Fig. 1. Overview of the proposed research method

## Data Sources

1. Observation: classroom learning activities, project activities, extracurriculars, and school habits related to ESD (waste, energy saving, school gardens, and other daily practices).
2. Semi-structured interviews: principal, teacher, homeroom teacher, and committee/parents.
3. Focus Group Discussion: teacher groups and student groups.
4. Documentation: curriculum, teaching modules/lesson plans, school programs, minutes, posters, photo documentation of activities, and artifacts of student projects.

## III. Results and Discussion Result

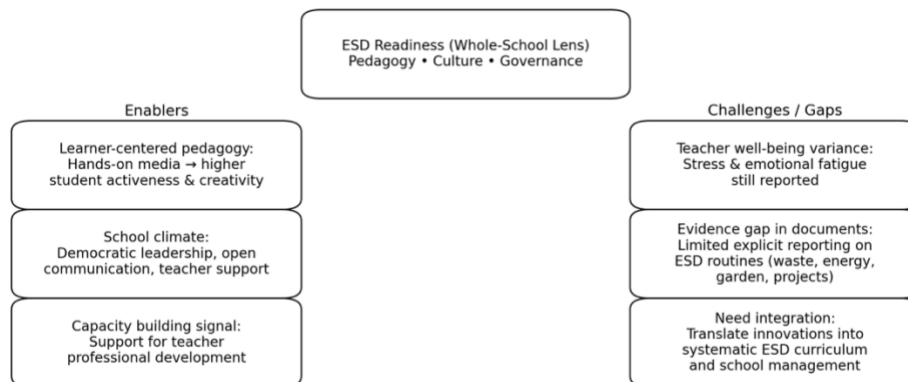


Fig. 2. Summary of Document-Based Findings Related to ESD Readiness at SDN 1 Sanggu

*"ESD that... education that is not just about pursuing values, yes. The child has concerns. So he understands the environment, understands clean living, understands frugality, understands also living together." K.S*

Demonstrate an understanding of ESD as an education of values and character: care, cleanliness, frugality, and co-living (social-environmental dimension).

*" The most visible is from active teacher learning. The child doesn't just listen. They hold tools, practice. There are still activities... For example, classroom cleanliness, pickets, that's a habit too. " K.S*

Describe active learning practices (hands-on) as the entrance to ESD, as well as the existence of classroom habits (pickets, cleanliness) as a form of habituation.

*" The written policy is not too formal like a big program, but we get used to it. Pickets, clean up. For electricity, yes, we remind you that the empty classroom is turned off. But yes... The name is children, it needs to be constantly reminded. " Kr*

Indicates that ESD is still dominant as an informal practice (habituation), not yet a systematic written policy/program; It needs to be strengthened to be consistent.

*" The challenge is time. Teachers have a lot of administration. Then there are many school activities. If you want to make a neat program, you need a team, you need a clear schedule. Facilities are also sometimes. There are teachers who are tired, yes. If you are tired, innovation will go down. So I usually try to manage, for example, the division of tasks should not pile up on those people. But still, sometimes some people feel heavy. " K.S*

*Gunawan et.al (Education for Sustainable Development (ESD)...) )*

Showing structural obstacles: administrative burden, congestion of activities, limited facilities, and teacher fatigue that have the potential to reduce ESD innovation; It requires team management and division of tasks.

*" For example, fractions. I made pieces of paper, there were circles to divide, there were also sticks. Children are told to form one-two, one-quarter. They continued to compare. Children are more active. They asked, "Is this the same mom?" They are small debates. Usually the one who is silent so he talks. Creative too, there are those who make their own way. " G*

Concrete evidence of active pedagogical practice: the use of simple media increases student participation, discussion, boldness, and creativity (key competencies for ESD).

*" If ESD is... Children are trained to think, solve problems. So the active method helps. It's just a theme that we attract to the environment or social. There is a time of tiredness. Especially if there are many reports, many school activities. We keep trying, but if it's too dense, innovation sometimes goes down. " G*

Teachers associate ESD with critical thinking and problem solving skills; But there are challenges of fatigue and task overload that make innovation difficult to maintain.

*" The sorting is not neat. There are a lot of people out there, but sometimes the kids are still around. If I accompany, I can. If you're careful, go back to the drawing board. Consistency. The children need habituation. And teachers must also be compact. If the rules vary from class to class, children are confused. Simple but the same rules. For example, "three habits": dispose of garbage properly, turn off the electricity, take care of plants. There is still light monitoring, for example class points. " WK*

Showing the challenges of school cultural consistency: waste sorting is not stable without mentoring; The proposed solution is a common rule standard and light monitoring (e.g. class points) to ensure sustainable behaviour.

Table 1. Qualitative Findings on ESD Practices and Challenges at SDN 1 Sanggu (Case Study)

Theme	Category / Code	Participant	Evidence (translated quote excerpt)	Analytic meaning (short)
<b>Meaning of ESD</b>	ESD as values and citizenship beyond academic scores	Principal (K.S)	"ESD is education not only about pursuing grades... children develop care... understand the environment, clean living, saving resources, and living together."	ESD is framed as character building and pro-social, pro-environmental living, not merely cognitive achievement.
<b>ESD-supportive pedagogy</b>	Active, hands-on learning	Principal (K.S)	"What is most visible is active teaching... children don't just listen; they handle tools and practise..."	The school highlights learner-centered pedagogy as a practical pathway to strengthen ESD competencies.

<b>School culture for sustainability</b>	Habituation routines (cleanliness, duty roster)	Principal (K.S)	"...there are activities such as class cleanliness and duty rosters; these are also habits."	ESD appears in daily routines that shape behaviour through repeated practice.
<b>Institutionalization gap</b>	Informal practice vs formal written program	School staff (Kr)	"The written policy is not yet formal like a big program, but we habituate... remind students to turn off electricity when the classroom is empty... children need continuous reminders."	ESD implementation relies on informal reminders and habituation; lack of formal policy may weaken consistency and sustainability.
<b>Structural challenges</b>	Time pressure, administrative workload, limited resources	Principal (K.S)	"The challenges are time... teachers have a lot of administration... many school activities... to make a neat program we need a team and clear schedule... facilities sometimes..."	Implementation is constrained by systemic workload and planning capacity, indicating the need for clearer teamwork and scheduling.
<b>Teacher well-being and innovation sustainability</b>	Fatigue reduces innovation	Principal (K.S)	"Some teachers are tired; when tired, innovation decreases... I try to distribute tasks... but some still feel burdened."	Teacher fatigue threatens continuity of ESD initiatives; workload distribution is seen as a mitigation strategy.
<b>Classroom practice building ESD competencies</b>	Participation, communication, creativity through simple learning media	Teacher (G)	"For fractions, I made paper cut-outs... students compared... asked 'is this the same?'... debated... quiet students spoke up... some created their own ways."	Hands-on learning fosters ESD-relevant competencies (active participation, dialogue, creativity, problem exploration).
<b>ESD competency orientation</b>	ESD as critical thinking and problem solving	Teacher (G)	"ESD trains children to think and solve problems... active methods help; we just need to connect themes to environmental or social issues..."	Teacher views ESD as competency-based; main task is to "bridge" active pedagogy to sustainability themes.
<b>Sustainability of practice</b>	Work overload reduces classroom innovation	Teacher (G)	"There are times of exhaustion... many reports and activities... when too busy, innovation sometimes drops."	Work intensification becomes a barrier to maintaining innovative, ESD-aligned pedagogy.
<b>Consistency of pro-environmental behavior</b>	Waste sorting inconsistent without supervision	Homeroom teacher (WK)	"Sorting isn't neat... bins exist but students still mix... with supervision it works; without it, it	Behavioural routines are fragile; infrastructure

			reverts... children need habituation.”	alone is insufficient without reinforcement and shared norms.
<b>Practical solution (school-generated)</b>	Standardized simple rules + light monitoring	Homeroom teacher (WK)	“Teachers must be aligned... simple shared rules: ‘three habits’ (dispose waste correctly, turn off electricity, care for plants)... light monitoring, e.g., class points.”	Proposed low-burden governance tool to increase consistency across classes and sustain habits.

## Discussion

### 3.2.1. ESD is framed as “education beyond grades” and linked to everyday life

The principal’s definition of ESD emphasizes care, clean living, saving resources, and living together (Manu et al., 2025; Merter & Balcioğlu, 2025). This meaning resonates with UNESCO’s view that ESD should empower learners to make informed decisions and act responsibly for environmental integrity and a just society. Compared with other studies, this finding is important because ESD in primary contexts is often reported as unevenly integrated or interpreted narrowly (e.g., as “environmental topics” rather than a broader transformative orientation).

### 3.2.2. Practice strength: active, hands-on pedagogy supports ESD competencies

Both school leaders and teachers described active learning where students manipulate materials, discuss, question, and develop their own strategies. This aligns with UNESCO guidance that ESD requires pedagogies that empower learners (participatory, inquiry-oriented, problem-based), rather than transmission-focused approaches. From a competency perspective, such classroom practice maps well onto widely cited ESD competencies (e.g., critical thinking, collaboration, problem-solving).

In the wider “whole-school sustainability” literature, strong pedagogy is frequently identified as a key lever, but its impact is amplified when it is connected to routines, structures, and professional knowledge-sharing among staff (Zamiri & Esmaeili, 2024). Interpretation for this case SDN 1 Sanggu appears “ESD-ready” pedagogically, even if sustainability themes are not yet consistently institutionalized across school operations.

### 3.2.3. Practice strength: habituation routines (cleaning duty, energy reminders) as “lived ESD”

Daily routines such as class cleaning duty and reminders to switch off electricity represent a practical pathway to “learning by living,” which is central to whole-school/whole-institution approaches to ESD. UNESCO highlights that ESD should be embedded not only in curriculum, but also across governance, campus management/operations, stakeholder engagement (Tomasella et al., 2024), and community involvement. In comparison, Indonesia’s Adiwiyata framework formalizes this logic by encouraging integration of environmental education across intra-curricular, co-curricular, and extracurricular activities, aimed at sustained pro-environmental behaviour.

### 3.2.4. Main challenge 1: “informal habituation” is vulnerable without written structures

A recurring point in the interviews is that sustainability-related routines exist, but written policies or a structured program are not yet formal (Liao & Lu, 2025). This is a classic “gap” noted in whole-school ESD research: schools may run activities, but lack routines and structures that make them consistent, monitorable, and sustainable over time. The Adiwiyata program illustrates what institutionalization typically looks like in Indonesia: it is commonly

described through core components such as environmentally oriented policy, environment-based curriculum, participatory environmental activities, and management of eco-friendly facilities. SDN 1 Sanggu's practices already resemble parts of this framework (habits and pedagogy), but strengthening the "policy and structure" layer would likely reduce inconsistency.

### 3.2.5. Main challenge 2: teacher time poverty and fatigue reduce innovation continuity

Both the principal and teacher mentioned time constraints, administrative workload, and fatigue that can lower innovation. This aligns strongly with broader evidence that teachers experience workload intensification and "time poverty," which limits capacity for pedagogical experimentation and program development (Creagh et al., 2025). Sustainability education research similarly emphasizes that implementation barriers persist when top-down expectations are not matched with practical support that fits teachers' day-to-day realities. Without workload-sensitive design, ESD risks becoming an "extra" that depends on individual enthusiasm, fluctuating with reporting cycles and competing school activities.

### 3.2.6. Main challenge 3: waste sorting consistency depends on norms, reinforcement, and ease

The homeroom teacher's observation that sorting works with supervision but reverts without it matches behaviour research showing that waste separation is influenced by knowledge/rules, social norms (Kiem et al., 2023) and consistent cues (Al-Barakat et al., 2025). Evidence reviews also suggest that interventions work better when they combine enabling conditions (clear infrastructure and prompts) with reinforcement mechanisms (feedback, monitoring, incentives). Interpretation for this case: bins alone are insufficient; school-wide standardization (the suggested "three habits") and light monitoring are consistent with what behaviour evidence indicates is effective.

## IV. Conclusion

This study set out to explain how Education for Sustainable Development (ESD) is practiced at SDN 1 Sanggu, what challenges constrain its implementation, and what feasible strategies could strengthen consistency and institutionalization in a Kalimantan elementary school context. The findings in the Results and Discussion confirm this expectation: ESD is understood by school actors as value-oriented education beyond academic scores and is enacted through active, hands-on pedagogy and daily routines such as class cleanliness duties and energy-saving reminders.

At the same time, the study shows a clear implementation gap that explains why ESD practices remain vulnerable over time. ESD routines are still largely informal rather than supported by formal written programs and consistent governance, while teacher administrative burden, time constraints, fatigue, and limited resources reduce the continuity of innovation. Behavioral consistency is also fragile, illustrated by waste sorting that tends to revert without adult reinforcement and shared norms across classes.

Based on these results, the development prospect of this work lies in translating existing "ESD-ready" pedagogy into a light but systematic whole-school structure: simple shared rules (e.g., the "three habits"), brief monitoring mechanisms (such as class points), and a small team with clear scheduling to protect teacher capacity. For further studies, future research can test the effectiveness of these low-burden governance tools through action research or quasi-experimental designs, expand comparisons across multiple schools in Kalimantan, and examine longitudinally how teacher workload management affects the sustainability of ESD routines and student behavior change.

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