Implementation of SDGs in Primary Schools to Increase Environmental Awareness and Wellbeing through Education Quality Management

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ABSTRACT

Objective: Primary education is pivotal in advancing the Sustainable Development Goals (SDGs), particularly in fostering environmental awareness and student well-being. However, SDG integration at the school level remains constrained by structural and pedagogical limitations. This study examines how SDG values are implemented in primary school learning and how education quality management enhances their effectiveness. **Method:** A qualitative multiple case study in 15 primary schools (Palu), with observations, interviews, and documentation analyzed thematically using Braun and Clarke's six-phase framework—familiarization, coding, generating themes, reviewing, defining/naming, and reporting—and method/source triangulation to enhance rigor. **Results:** Results showed that Schools with structured quality management systems and participatory leadership were more successful in internalizing SDGs values in learning, particularly through thematic activities and the Pancasila Student Profile Strengthening Project (P5). The impact is observed in the improvement of students' environmentally conscious behavior and social empathy. This study confirms the importance of a systemic approach that integrates pedagogical and managerial aspects to support the achievement of SDGs in basic education. **Novelty:** The findings contribute to the theory of sustainable education and offer practical implications for educational policy at the local and national levels.

INTRODUCTION

The 21st century is marked by interrelated global crises, climate change, environmental degradation, and widening social inequality that threaten the foundations of sustainable development (Lopez-Claros et al., 2020; Onbargi, 2024). To address these challenges, the United Nations launched the Sustainable Development Goals (SDGs) as a universal agenda demanding a balanced pursuit of economic growth, social justice, and ecological preservation. Education stands at the core of this transformation, especially basic education, which lays the groundwork for sustainable character, environmental literacy, and social empathy from early childhood (Hofman-Bergholm 2020; UNESCO 2017). In Indonesia, this commitment is reflected in the Pancasila Student Profile Strengthening Project (P5), a nationwide effort to translate SDG principles into classroom practice and cultivate critical, collaborative, and environmentally responsible learners.

Despite this policy direction, the implementation of SDG-based education in elementary schools remains inconsistent (Peng et al., 2024). Research shows limited curriculum integration, low teacher competence in sustainability pedagogy, and weak monitoring of behavioral outcomes (Azmi et al., 2024; Fischer et al., 2022; Hung, 2025). These gaps highlight that achieving SDG 4 (Quality Education) and SDG 3 (Good Health and Well-Being) requires not only innovative teaching but also robust educational quality management.

This issue is particularly acute in Palu City, which continues to rebuild its education system after the 2018 earthquake and tsunami. In this post-disaster context, schools have a dual mandate: to restore learning continuity and nurture resilience through sustainability education. However, field evidence indicates that many initiatives remain symbolic, limited to slogans or isolated projects, because quality-management mechanisms are fragmented and leadership participation varies across schools (Buaja et al., 2025; Sa'ad et al., 2025). Understanding how schools in this recovery environment internalize SDG values offers valuable insight into the relationship between pedagogical reform and institutional governance.

Against this background, this study investigates how SDGs are implemented in primary school learning and how education quality management mechanisms contribute to their realization. Specifically, it addresses three research questions: (1) How are SDG values integrated into classroom instruction? (2) How does educational quality management sustain and institutionalize this integration? (3) What impact do these efforts have on students' environmental awareness and well-being? By linking the global sustainability agenda with the local realities of post-disaster Palu, this study advances a nuanced understanding of sustainable-quality education as a pedagogical–managerial nexus through which transformative learning and systemic governance co-produce resilience and value-driven educational reform. Within this conceptual framework, the study's primary contribution lies in its integrative approach that connects SDG-based learning practices with educational quality management systems, thereby enriching the limited literature on sustainability-oriented education at the elementary school level and providing a strategic foundation for policymakers and practitioners to design implementation models that are contextual, adaptive, and oriented toward value transformation (Combe, 2022; Gunansyah et al., 2021; Swain & Dobers, 2025; UNESCO, 2024).

RESEARCH METHOD

Research Design
This study used a qualitative approach with a multiple case study design (Stake, 1995; Yin, 2009). This approach allows researchers to explore the process of implementing SDGs values and education quality management in the real context of primary schools (Jeronen, 2021). This design was chosen to understand the practices, experiences, and challenges from the perspectives of educational actors directly and to capture the social and institutional complexities behind the implementation of sustainability-based education (Goraş-Postică, 2023).

Research Population and Sample
The study involved all public primary schools in Palu City, using a two-stage selection process to ensure contextual diversity and methodological coherence in the qualitative multiple case study. First, a stratifiedrandom listing created a diverse pool representing Palu's varied post-disaster contexts without statistical inference. Second, following Stake (1995) and Yin (2009) qualitative case logic, 15 schools were purposively selected based on their potential to illuminate the interactions between SDG-based learning and quality management practices. This approach balances fair initial representation with depth-oriented case choice. In total, 56 participants, including principals, teachers, and students, were involved.

Table 1. Dsitribution of Respondents Based on Role

Respondent	Distribution
School Principal	27%
Teachers	46%
Students	27%

Data Collection Methods
Data were collected using three main techniques.

a. Participatory Observation
Participatory observation was used to capture the dynamics of SDGs-based learning, P5 implementation and quality management practices. Following Stake's (1995) issue-guided principle, observation sites were selected purposively, focusing on classes and activities that applied the SDGs. Using Yin's (2009) participant-observation approach, the researcher joined the selected routines. Observation guides were drawn from SDGs Goals 3–4 (Swain & Dobers, 2025; UN ESCAP, 2020), and data were cross-validated with interviews and documents (Huemann & Turner, 2024; Melindawati et al., 2025).

b. Semi-structured interviews
Interviews were conducted with school principals and teachers using guidelines containing open-ended questions. The interviews aimed to explore their understanding, experiences, and strategies for implementing SDGs-based education and the role of education quality management (Zickafoose et al., 2024).

c. Documentation Study
The documents analyzed include teaching modules, school work programs, implementation reports of the Pancasila Student Profile Strengthening Project (P5), education quality documents, and documentation of SDGs-based learning activities(Barrett et al., 2006; Espino-Díaz et al., 2025; Pamancar et al., 2024; Pastore & Zimmermann, 2019).

Research Procedure
The stages of research implementation were carried out systematically through the following steps, as shown in Figure 1:
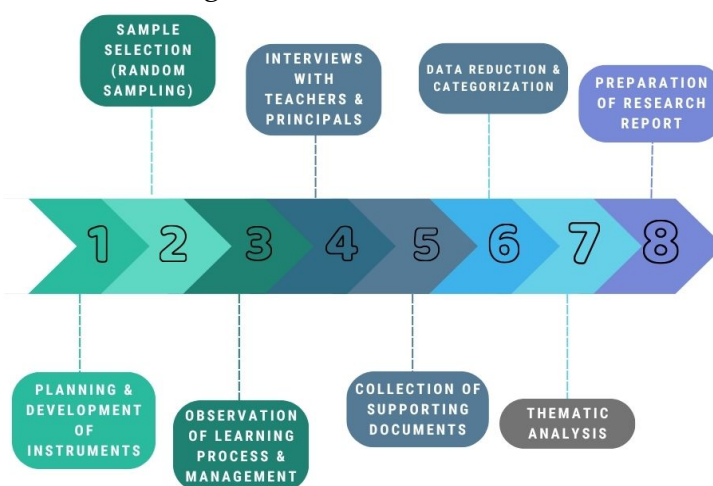

Figure 1. Flowchart of Research Procedure

The planning and development of instruments involved preparing observation guidelines, interview protocols, and documentation checklists based on SDGs indicators and principles of education quality management (Billups, 2022). Next, sample selection did not use random sampling; instead, it followed a two-stage procedure in which stratified listing ensured contextual diversity, followed by the purposive selection of the final participating schools and respondents. The data collection stage involved observation of the learning process and school management (Kolako, 2024), followed by interviews with teachers and principals to explore perceptions and experiences related to SDGs implementation (Lambert et al., 2023), and document collection to analyze school documents that support the integration of SDGs and education quality (Hasibuan, 2024). Subsequently, the data were reduced and categorized to filter relevant information aligned with the research focus ("Introduction to Data Analysis Handbook," 2020; Mezmir, 2020). This was followed by a thematic analysis to identify patterns, themes, and relationships across categories (Naeem et al., 2023), culminating in the preparation of the research report as the final stage.

Data collection instruments

The instruments used in this study consisted of observation guides designed based on indicators of SDGs achievement and principles of education quality management (Alisjahbana & Murniningtyas, 2018; Setyaningrum et al., 2021), semi-structured interview guidelines that were validated through expert judgment (Naz et al., 2022), and a checklist-based document analysis format developed to assess both the presence and quality of SDGs integration in school documents (Indana & Pahlevi, 2023). Prior to field data collection, all instruments were tested for readability and validity to ensure accuracy and reliability in capturing the research objectives (Heale & Twycross, 2015; Olmsted 2024).

The semi-structured interview guidelines were validated through expert judgment involving three educational research experts with extensive experience in qualitative methodology and SDG-based curriculum development. Each expert independently reviewed the relevance, clarity, and alignment of the interview items with the research objectives and the SDG indicators. Feedback was then discussed in a joint consultation to refine the wording, eliminate redundancy, and ensure conceptual validity. This process followed the qualitative instrument validation procedure recommended by Naz et al. (2022), ensuring that the final guide was both theoretically sound and contextually appropriate for the primary school setting in Palu.

Data Analysis Technique

Data were analyzed using the *thematic* analysis approach developed by Braun and Clarke. The analysis was conducted in six stages (see Figure 3): (1) understanding the data as a whole, (2) coding the data, (3) identifying potential themes, (4) reviewing themes, (5) naming and defining themes, and (6) compiling a narrative of the results. To enhance validity, method and source triangulation was applied through a systematic cross-comparison of observation notes, interview transcripts, and school documents. Patterns identified in one data type were verified in the others; for example, classroom observations on P5 project implementation were compared with teacher statements and program documents to confirm consistency and identify discrepancies. This iterative validation ensured that the emerging themes represented the convergence of multiple sources of evidence rather than a single perspective (Billups, 2022; Braun & Clarke, 2006).
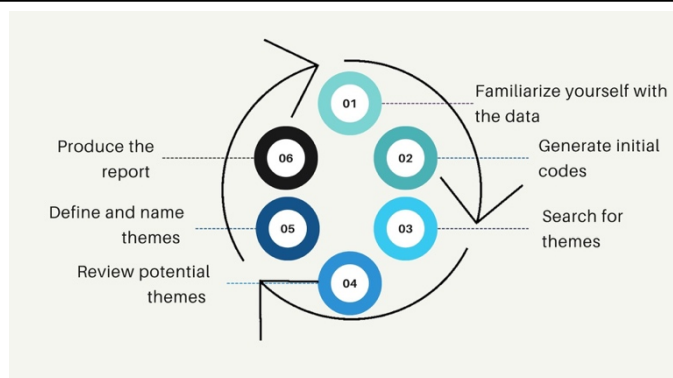
Figure 2. Braun and Clarke Thematic Analysis Model

Operational Definitions of Key Concepts

In this study, two interrelated constructs were central to explaining the success of SDGs implementation in primary schools. First, participative principal leadership refers to a leadership model in which the school principal actively involves teachers and staff in decision-making, program planning, and evaluation processes related to learning and school development (Arina et al. 2023). The participative approach emphasizes collaboration, shared responsibility, and open communication channels that encourage initiative and innovation among teachers (Bush, 2020; Hallinger and Heck, 2010).

Second, the structured internal quality evaluation system denotes the systematic mechanism used by schools to plan, monitor, and evaluate learning quality through documented instruments such as *Rencana Kerja Sekolah* (RKS), *Rencana Kegiatan dan Anggaran Sekolah* (RKAS), and supervision forms(Pujiarti et al., 2023). This system embodies the Plan–Do–Check–Act (PDCA) cycle of continuous improvement (Deming, 1986; Sallis, 2015), ensuring that each learning program, including P5 projects, is planned, implemented, reviewed, and refined in a consistent feedback loop. Both constructs serve as analytical lenses connecting educational leadership and quality management within the framework of the SDGs.

RESULTS AND DISCUSSION

Results

This study reveals key findings related to the implementation of SDGs values in learning in primary schools, the role of education quality management in supporting the implementation, and its impact on environmental awareness and student well-being. Data were obtained through observations, interviews and documentation studies in 15 primary schools in Palu City.

1. Implementation of SDGs Values in Learning

The results of the observations show that most teachers have started to integrate SDGs values, especially Goal 3 (health and well-being) and Goal 4 (quality education), into thematic learning activities and the Pancasila Student Profile Strengthening Project (P5) (see Figure 4).
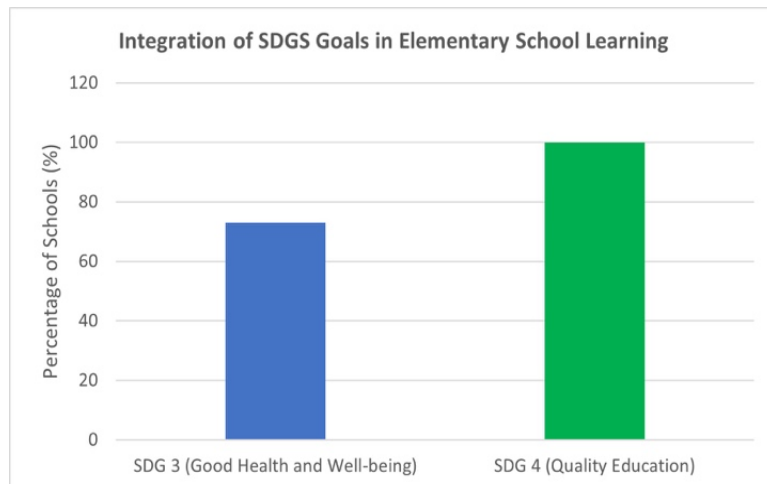
Figure 3. Integration of SDG'S Goals in Elementary School Learning

Figure 3 illustrates the integration of SDG values into elementary school learning. The data show that SDG 4 (Quality Education [100%]) is the most consistently and deeply implemented goal, primarily through the mandatory Pancasila Student Profile Strengthening Project (P5). This program serves as a structured vehicle for embedding quality education values, such as critical thinking, collaboration, and reflective learning, into everyday classroom practices. In comparison, SDG 3 (Good Health and Well-being [73%]) appears less explicitly emphasized but is still visible through the "Sustainable Lifestyle" theme, which introduces students to health education and environmental responsibility. Overall, the dominance of SDG 4 reflects a systemic alignment between national curriculum priorities and the global sustainability agenda, indicating that schools in Palu are not only meeting formal requirements but also cultivating meaningful behavioral changes toward sustainable living practices.

2. The role of education quality management

Principal leadership and internal quality evaluation systems are important factors in supporting the integration of SDGs. Schools with structured quality documents (RKS, RKAS, and supervision instruments) are more systematic in implementing SDG-based learning.
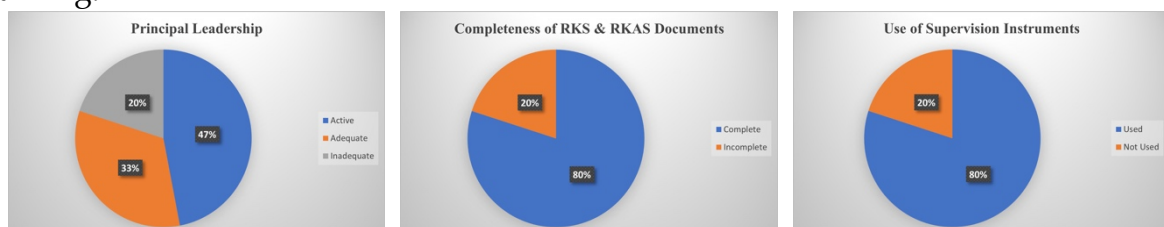
Figure 4. Principal Leadership, Completeness of RKS & RKAS Documents, Use of Supervision Instruments

The interviews indicated that principals with active leadership dominated the findings, correlating with schools that were more systematic in their implementation of the SDGs. Most schools have a complete quality planning document, which is a key prerequisite for integrating SDG-based programs into the curriculum. The high use of internal supervision instruments indicates that schools have implemented quality evaluation mechanisms that support the sustainability of SDGs value implementation.

3. **Impact of SDGs Integration and Quality Management on Environmental Awareness and Student Wellbeing**

The integration of SDGs through the quality education approach positively contributes to changes in student behavior, especially in terms of environmental responsibility and social solidarity. This was obtained by triangulating the observation and interview data (see Table 2).

Table 2. Impact of SDGs Integration and Quality Management on Primary School Students Behavior

Aspects of Student Behavior Change	Percentage of Respondents (%)
Responsibility for the environment	85
Solidarity and social empathy	77
Concern for school hygiene	81
Active participation in P5 projects	88

The remarkably high rate of active participation (88%) in P5 projects reflects several qualitative factors identified through the interviews and observations. First, schools have institutionalized P5 as part of their internal quality management cycle, so project activities are not treated as occasional events but as structured learning routines. Teachers prepare planning and reflection sheets aligned with the Plan-Do-Check-Act (PDCA) cycle, ensuring continuous student involvement and feedback.

Second, participative principal leadership motivates teachers to design projects collaboratively and allocate time for student-led initiatives. This managerial support creates a sense of ownership and enthusiasm among learners. Third, the post-disaster context of Palu contributes to students' emotional engagement; many projects address real-life recovery themes environmental rehabilitation, hygiene, and community solidarity making learning personally meaningful. Fourth, peer collaboration and parental involvement strengthen students' sense of contribution; activities such as waste-reduction campaigns and school cleanliness drives allow students to see tangible outcomes of their efforts. Overall, these factors explain why the quantitative indicator of 88 % participation represents not only numerical involvement but also a transformation in student agency, where learners act as co-creators of sustainable change rather than passive participants in teacher-directed tasks.

Discussion

1. **SDGs Implementation through the Pancasila Student Profile (P5)**

This subsection discusses how P5 serves as the main pedagogical medium for integrating SDG values into learning. The analysis shows that project-based learning under the P5 framework transforms classrooms into reflective laboratories, where students experience sustainability in practice.

The findings of this study show that the implementation of Sustainable Development Goals (SDGs) values in learning in primary schools in Palu City has strengthened continuous quality improvement in primary education. First, from a process quality perspective, the implementation of P5 enriches learning with authentic experiences and contextual values that not only improve cognitive outcomes but also shape students' character. P5 serves as a key indicator of the quality of the learning process, as it promotes meaningful and reflective learning.

Second, the principle of evaluation and continuous improvement is evident in the P5 cycle, which includes the stages of planning, implementation, reflection, and follow-up. This is in line with the PDCA (Plan-Do-Check-Act) framework commonly used in education quality management systems. For example, after completing one project theme, teachers and students together reflect on improving the implementation of the next project, a systemic quality loop practice.

Third, the participation of students as active subjects in P5 strengthens the participatory dimension of school quality culture. In the context of quality management, students are no longer passive recipients of learning but internal quality agents who can define issues, design solutions, and evaluate the success of their own projects. This strengthens the competencies of leadership, innovation, and social responsibility from an early age.

Fourth, P5 encourages the formation of a collaborative learning ecosystem through the involvement of cross-actors such as teachers, parents, local communities, and other stakeholders. This collaboration reflects the principle of shared leadership, which in quality management, is known as a determinant of the success of an adaptive and collective quality culture. Fifth, P5 plays a central role in building a school culture with character. By using the values of the Pancasila Student Profile as the framework, the school creates an inclusive, ethical, and meaningful learning environment. The implementation of values such as mutual cooperation, democracy, and independence not only enriches the quality dimension of education (SDG 4) but also strengthens awareness of the importance of health and environmental balance (SDG 3).

Furthermore, the role of education quality management is a reinforcing factor in the successful implementation of SDGs. Principal leadership and internal quality evaluation systems are determinant factors in the successful integration of Sustainable Development Goals (SDGs) values into primary school learning. Principal leadership is the main foundation for driving the transformation of sustainability-oriented learning.

2. The Role of Education Quality Management in Supporting SDGs Implementation

This subsection elaborates on how education quality management reinforces the implementation of SDGs at the school level. Evidence from interviews revealed that participative principal leadership and systematic internal evaluation function as catalysts for teacher initiative and collaborative planning.

The interplay between participative principal leadership and a structured internal quality evaluation system forms the managerial backbone of SDG-based learning. Participative leadership ensures that planning and supervision are collective processes that foster teacher ownership and commitment. Meanwhile, the structured evaluation system translates this leadership into measurable routines, documented supervision, reflective meetings, and follow-up actions that sustain quality cycles. This interaction transforms quality management from a compliance activity into a learning-oriented practice that nurtises continuous improvement across the school community.

Findings from in-depth interviews show that principals who apply participatory approaches in quality management are significantly able to mobilize teachers' initiatives to integrate SDGs themes into classroom activities. This approach creates a collaborative climate that supports student engagement in P5 projects, such as "Sustainable Lifestyle." The availability and use of quality documents such as RKS, RKAS, and supervision

instruments are important in directing strategic planning and supervision of SDGs implementation.

Schools that systematically and actively use quality documents tend to be more structured in developing indicators of success, indicators of achievement of SDGs values, and monitoring systems that enable reflection and continuous improvement. This reflects the link between internal quality systems and the successful implementation of a sustainable education agenda. Consistent internal supervision has triggered a cycle of in-depth evaluation of the quality of learning and its relevance to the global and local contexts. Supervision functions not only as an administrative control tool but also as an instrument to increase teachers' capacity to design characterful, contextual, and inclusive learning in line with the spirit of continuous quality improvement (CQI) in education quality management.

3. Impact of SDGs Integration and Quality Management on Student Awareness and Well-Being

This subsection interprets the behavioral impact of SDG-based learning and quality management on students' environmental awareness and social well-being. Triangulated data indicate that sustainability values have been internalized through daily practices and collaborative reflection cycles.

The integration of SDGs values through the education quality management approach has a positive impact on changes in the behavior of primary school students, especially in the aspects of environmental awareness and social welfare. Interviews with teachers and principals indicated that students began to show changes in mindsets that were more reflective, critical, and socially aware. Teachers reported an increase in students' ability to link local issues with global issues; for example, in a project themed Sustainable Lifestyle, students not only discussed the topic of hygiene, but also took the initiative to campaign for the reduction of plastic waste at school and home. This reflects the development of ecological awareness, which is contextual in nature. This behavior change cannot be separated from the role of the internal quality management system that encourages the systematic and reflective implementation of project-based learning. The cycle of planning, implementation, evaluation, and improvement inherent in quality management (especially through supervision and thematic RKS/RKAS) provides space for teachers to integrate sustainability values into learning activities while monitoring their impact holistically.

Theoretically, these results support the transformative education approach that positions students as agents of change (UNESCO, 2020) and strengthen the sustainable quality management framework that emphasizes not only academic output but also aspects of character, ethics, and global awareness. Integrative and reflective learning through the Pancasila Student Profile Strengthening Project (P5) has proven to be able to bridge the gap between national education goals and commitment to the global agenda of sustainable development. This discussion shows that the success of SDGs education in primary schools cannot be separated from an adaptive quality management system, visionary leadership, and the integration of sustainability values into a meaningful and contextualized learning process. Collaboration between curriculum, management, and school culture components is key to transforming primary schools into agents of change for a sustainable future.

4. Integrative Reflection and Theoretical Implications

The integrative reflection of this study reveals that the success of SDGs implementation in Palu's primary schools depends on the dynamic interaction between participative leadership, structured internal quality evaluation, and transformative learning practices(Campoy-Cubillo & Jimenez-Estrada, 2025; Nafiu, 2025). As highlighted by field data, schools that applied the Plan–Do–Check–Act (PDCA) cycle as part of their internal quality routines were more consistent in embedding SDG 4 values through the Pancasila Student Profile (P5) framework (Raihan et al., 2025; Samuel & Farrer, 2025). This synergy aligns with the logic of Total Quality Management in education, where continuous improvement becomes both a managerial and pedagogical principle (Deming, 1986; Rosidin et al., 2025; Safardan, 2024; Sallis, 2015).

From a theoretical standpoint, these findings extend the notion of Education for Sustainable Development by demonstrating that sustainability education is effective when institutionalized through quality assurance systems. The evidence supports the argument that quality management is not merely administrative compliance but an epistemic process of learning—a mechanism through which teachers and students co-construct knowledge and values consistent with global sustainability goals (Hofman-Bergholm, 2020; UNESCO 2017). This resonates with transformative education theory, where reflection and participation are central to behavioral change and community resilience.

The study also contributes to the literature on post-disaster educational governance by demonstrating how recovery contexts accelerate innovation in school management. In Palu, the dual need to restore learning continuity and build resilience encouraged schools to adopt participatory structures and reflective cycles to this end. This situational adaptation transforms SDG-based learning into a process of institutional healing, in which quality assurance serves as a stabilizing force for both teachers and students (Buaja et al., 2025; Sa'ad et al., 2025). Consequently, the theoretical implication is that sustainable-quality education emerges when systemic management and transformative pedagogy converge, forming a replicable model for other developing or disaster-affected regions to follow.

In summary, this study strengthens the conceptual bridge between Total Quality Management, Transformative Learning, and Sustainable Development Education. By demonstrating that participative principal leadership and structured evaluation mechanisms act as mediators linking managerial reform with behavioral transformation, it provides a grounded model of how schools evolve from compliance-driven institutions into learning organizations that cultivate sustainable values.

CONCLUSION

Fundamental Finding: This study explored the integration of SDGs into primary school learning in Palu City, Indonesia. The findings reveal that SDG 4 (Quality Education) is most effectively realized through Pancasila Student Profile (P5) projects, which transform classrooms into participatory spaces for sustainability learning. The success of implementation depends on two interrelated factors: participative principal leadership and structured internal quality evaluation, which together institutionalize continuous improvement. Within Palu's post-disaster context, these managerial and pedagogical mechanisms not only sustain learning continuity but also rebuild collective resilience among teachers, and students. This study advances the theory of Education for

Sustainable Development by integrating Total Quality Management and Transformative Learning perspectives, showing that quality assurance operates as a continuous learning process rather than as an administrative control (Deming, 1986; Sallis, 2015). Through participative leadership and reflective evaluation, schools can transform into learning organizations that internalize sustainability values. Practically, the findings offer a scalable model for embedding SDGs into school governance through participatory management, PDCA-based reflection, and empowering teachers. Embedding these mechanisms into policy and professional training can ensure that sustainability education evolves as a systemic, value-driven reform across primary schools.

Limitation : This study was conducted in 15 public primary schools located in Palu City, which represents a post-disaster educational ecosystem still in the process of rebuilding after the 2018 earthquake and tsunami. While this context provides rich insights into how SDG-based education and quality management interact under recovery conditions, it also limits the generalizability of these findings. The results should therefore be interpreted as contextually deep but geographically specific—reflecting the adaptive capacity of schools in a recovery setting rather than the general condition of Indonesian primary education as a whole. Future research should expand to comparative contexts, including non-disaster and urban settings, to examine whether similar patterns of participative leadership, structured quality evaluation, and SDGs integration are observed across different regions.

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