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Research Article

Digital Citizenship Education as a Pathway to SDG Alignment (4, 10, and 16): A Qualitative Study of Indonesian Elementary Education

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Abstract
This study explores the implementation of digital citizenship education in Indonesian elementary schools as a pathway to achieving the Sustainable Development Goals (SDGs) 4 (Quality Education), 10 (Reduced Inequalities), and 16 (Peace, Justice, and Strong Institutions). Using a qualitative descriptive design and thematic analysis, the research examines national policies, academic literature, and school-based initiatives related to the Kurikulum Merdeka, Profil Pelajar Pancasila, and Adiwiyata (Green School) programs. Findings reveal that digital citizenship education is increasingly integrated through projects, digital storytelling, and ethical online engagement that nurture students' critical thinking and civic responsibility. However, challenges such as limited teacher competence, uneven digital infrastructure, and the absence of localized ethical frameworks persist. The study's theoretical contribution lies in integrating Pancasila ethics with digital citizenship and sustainability education, framing moral, civic, and technological dimensions as mutually reinforcing components of transformative learning. This synthesis underscores the importance of coherent policy implementation, teacher professional development, and culturally grounded pedagogy to promote equitable, ethical, and sustainable digital learning environments aligned with the SDGs.

Keywords: Digital Citizenship, Qualitative Descriptive Analysis, Ethical Framework, Elementary Schools, Sustainability

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INTRODUCTION

The rapid integration of digital technologies into education has transformed how learners acquire, create, and share knowledge. Beyond technical proficiency, schools are now responsible for cultivating responsible, ethical, and critically aware citizens who can participate meaningfully in digital society. Digital citizenship education (DCE) equips individuals with the knowledge, skills, and values necessary to navigate online spaces safely, productively, and ethically (Ribble, 2015; Shi, Chan, & Lin, 2023). It encompasses multiple dimensions, including digital literacy, online ethics, cybersecurity awareness, and civic participation in digital contexts (Lozano-Díaz & Fernández-Prados, 2020; Lo, 2024). In an era increasingly influenced by artificial intelligence and the spread of misinformation, these competencies are essential for fostering empowered, critical, and compassionate digital citizens (Farooqi, Amanat, & Awan, 2024; Aderibigbe et al., 2023).

Digital citizenship education directly supports the objectives of the United Nations' 2030 Agenda for Sustainable Development by contributing to Sustainable Development Goal 4 (Quality Education), which promotes inclusive and equitable learning opportunities. It also advances SDG 10 (Reduced Inequalities) by addressing digital participation gaps and SDG 16 (Peace, Justice, and Strong Institutions) by encouraging ethical and socially responsible online engagement (Kioupi & Voulvoulis, 2019; Makinde, Sulyman, & Ibrahim, 2024; Hajj-Hassan, Makki, & Dbaibo, 2024). According to UNESCO (2018) and OECD (2023), integrating digital ethics and sustainability within citizenship education strengthens social cohesion and democratic resilience.

In Indonesia, the rapid expansion of internet access has created both opportunities and challenges for education. Although digital penetration continues to rise, disparities remain significant. National data indicate that around 41 percent of rural communities are still digitally underconnected, and the country's average digital literacy score stands at 3.54 out of 5 (Kominfo, 2021). Such inequalities risk limiting the transformative potential of DCE and hinder the achievement of SDGs related to equity and inclusion (Tan, Wong, & Chen, 2024). Responding to these challenges, the government introduced the *Kurikulum Merdeka* (Independent Curriculum), designed to enhance flexibility, student autonomy, and critical thinking (Damanik et al., 2025; Kumari, 2024). Its implementation aligns with international reforms linking teacher quality to student learning and civic outcomes (Blömeke, Olsen, & Suhl, 2016; Castro, Glewwe, & Montero, 2019). However, its success depends on educators' pedagogical and ethical readiness to transform abstract digital citizenship goals into concrete learning experiences (Demirdöğen et al., 2016; Davis, Petish, & Smithey, 2006).

At the core of Indonesia's educational philosophy lies *Pancasila*, a set of five foundational values emphasizing belief in one God, just and civilized humanity, national unity, democracy guided by wisdom, and social justice for all. These principles serve as an ethical compass for digital engagement and civic participation (Aeni et al., 2024; Yorman & Sadam, 2025). The *Profil Pelajar Pancasila* (Pancasila Student Profile) operationalizes these values through six attributes: faith, global diversity, mutual cooperation, independence, critical thinking, and creativity (Damanik, Murdiono, & Suharno, 2024). Integrating DCE within this framework allows students to develop moral reasoning and digital empathy rooted in Indonesia's cultural and spiritual values (Triyani et al., 2021; Musa & Wulan, 2024). Complementing this ethical foundation, the *Adiwiyata* (Green School) program

institutionalizes sustainability through policy, curriculum, and community participation (Suprapto & Hartini, 2023; Kodir et al., 2022). Embedding digital citizenship within such a structure reinforces the concept of "digital sustainability," connecting ecological mindfulness with responsible technological engagement (Junaidah, Aeni Mahardika, & Ma'arif, 2025).

Previous studies have examined elements of digital literacy, sustainability, and character education separately, but few have analyzed how these domains intersect within Indonesia's moral-educational ecosystem. Meta-analyses and systematic reviews (Edwards et al., 2020; Shi et al., 2023) emphasize that most research remains fragmented and lacks a contextual framework linking global citizenship, digital ethics, and local value systems. However, few studies have systematically explored how digital citizenship can be operationalized through Indonesia's ethical-educational frameworks such as *Pancasila* and *Adiwiyata*. This paper fills that gap by situating DCE within national efforts to promote sustainable and value-based education.

The theoretical foundation of this study rests on three interconnected perspectives. First, digital citizenship theory provides the behavioral and ethical basis for responsible participation in digital environments (Ribble, 2015). Second, education for sustainable development (ESD) links learning outcomes to ecological and social responsibility (Kioupi & Voulvoulis, 2019). Third, *Pancasila* offers an indigenous moral philosophy that integrates ethics, cooperation, and justice within education (Aeni et al., 2024). Together, these frameworks form an integrative model that aligns ethics, sustainability, and digital literacy as pillars of transformative learning.

This study uses a qualitative descriptive design with document-based analysis to examine policies, curriculum guidelines, and school programs related to digital citizenship education in Indonesia. Its twofold purpose is (1) to analyze how DCE is implemented through the *Kurikulum Merdeka*, *Profil Pelajar Pancasila*, and *Adiwiyata* initiatives, and (2) to propose a contextual framework for embedding digital citizenship within value-based education systems aligned with SDGs 4, 10, and 16. This approach contributes to extending global citizenship education discourse by integrating Southeast Asian moral philosophy into the pursuit of ethical and sustainable digital learning.

RESEARCH METHOD

Research Design

This study adopted a qualitative descriptive design to examine how digital citizenship education (DCE) is conceptualized and implemented through Indonesia's educational and ethical frameworks. A qualitative descriptive approach is particularly suited for analyzing policy and document-based data because it provides rich, low-inference descriptions of phenomena without imposing external theoretical assumptions (Colorafi & Evans, 2016; Bradshaw, Atkinson, & Doody, 2017). This design enables a systematic exploration of how educational documents articulate values, strategies, and policy priorities related to digital citizenship, sustainability, and ethics, rather than measuring their causal effects in the field.

Research Target/Subject

The scope of the research covered three main types of documents: national policy frameworks issued by the Ministry of Education, Culture, Research, and Technology,

scholarly articles published in Scopus, Web of Science, or SINTA-indexed journals, and school or community reports related to character and sustainability education. Document selection followed explicit inclusion and exclusion criteria to ensure the quality and relevance of the data. The inclusion criteria consisted of documents published between 2015 and 2025, written in English or Bahasa Indonesia, and containing substantial discussion of DCE, the Sustainable Development Goals (SDGs), or Pancasila-based education. The exclusion criteria ruled out non-academic materials such as blogs, news articles, and documents without verifiable institutional authorship. Source reliability was maintained by prioritizing official repositories and peer-reviewed publications. This scope enabled a comprehensive understanding of how national policies and school-based programs conceptualize ethical digital engagement and sustainability within Indonesia's educational context.

Research Procedure

Data collection was conducted in three systematic phases, adapted from Page et al. (2021) and Garzón et al. (2025); 1) Identification: Relevant documents were retrieved from Scopus, Web of Science, and government archives using keywords "digital citizenship," "Pancasila," "sustainability education," and "Merdeka Curriculum."; 2) Organization: All documents were compiled into a reference matrix categorizing each source by policy, pedagogical practice, and ethical framework. This Document Analysis Matrix (Appendix A) facilitated cross-source comparison of key concepts, policy directives, and pedagogical implications; 3) Thematic Coding: The selected documents underwent iterative reading, annotation, and coding using inductive thematic analysis (Braun & Clarke, 2006). Codes were initially open-ended, capturing recurring ideas (e.g., digital ethics, teacher readiness, sustainability). These were then grouped into higher-order categories through axial coding and synthesized into three overarching themes: (1) teacher competency gaps, (2) institutional readiness, and (3) Pancasila-based digital ethics.

Instruments, and Data Collection Techniques

The instrument used was a document analysis matrix developed to extract data concerning educational strategies, policy coherence, and ethical frameworks. Data were collected using systematic review and textual analysis techniques across selected sources (Edwards et al., 2020).

Data Analysis Technique

The thematic analysis followed six stages: (1) familiarization with texts, (2) initial coding, (3) theme generation, (4) theme review, (5) definition and naming, and (6) synthesis of interpretations with relevant theories. Inductive codes were refined through comparison across documents and validated against existing conceptual models of DCE (Ribble, 2015; Kioupi & Voulvoulis, 2019). The process resulted in a thematic map showing the interplay between policy discourse, educational practice, and ethical orientation.

A PRISMA-style flow was employed to ensure procedural transparency. Out of 320 identified records, 80 duplicates were removed. 240 documents were screened, 40 full texts were assessed for relevance, and 20 qualified studies were included in the final synthesis. This systematic process supports traceability and replicability of the document selection.

Trustworthiness and Credibility

To strengthen the validity and trustworthiness of the findings, several strategies were implemented. Peer debriefing was conducted with two academic colleagues specializing in educational policy and civic ethics to verify the coding logic and thematic consistency. Triangulation was achieved by cross-referencing analytical categories with international frameworks from UNESCO (2023) and OECD (2024) on digital education and sustainability. An audit trail was also maintained throughout the research process, documenting analytical decisions and data management steps. Although the study was conducted by a single researcher, these measures ensured interpretive credibility, minimized subjective bias, and enhanced overall methodological reliability.

RESULTS AND DISCUSSION

Policy and Curricular Integration: Embedding Digital Citizenship in National Frameworks

Findings reveal a strong governmental commitment to embedding digital citizenship within Indonesia's education system through a multidimensional approach integrating curriculum, policy, and moral education. The Merdeka Curriculum serves as a foundational policy emphasizing 21st-century competencies and preparing students for ethical participation in the digital era (Aeni et al., 2024; Damanik et al., 2025). Digital literacy is not treated as a standalone subject but infused across disciplines, promoting a holistic model consistent with UNESCO's Global Citizenship Education and Education for Sustainable Development (ESD) (Kioupi & Voulvoulis, 2019; Musa & Wulan, 2024).

The Pancasila Student Profile (P5) complements this policy by providing co-curricular learning contexts that translate digital ethics into practice. Thematic projects on democracy, unity, and diversity enable students to apply digital skills in civic-oriented ways that reflect Pancasila's moral philosophy (Yorman & Sadam, 2025; Lozano-Díaz & Fernández-Prados, 2020). Integration occurs through lesson planning workshops and teacher professional development (PD) modules that encourage contextual adaptation. However, implementation success is uneven due to differing local capacities and institutional support levels.

Pedagogical Practices in Action: Implementing Digital Ethics and Online Safety

At the classroom level, teachers are increasingly using interactive pedagogies such as digital storytelling, project-based learning, and gamified assessments to cultivate responsible online behavior (Triyani et al., 2021; Damanik, Murdiono, & Suharno, 2024). These methods are favored because they increase student engagement and align with learner-centered approaches promoted by the Merdeka Curriculum. Discussions on cyber safety, data privacy, and digital etiquette are now more frequent, helping students recognize misinformation and online risks (Shi, Chan, & Lin, 2023; Helmiatin, Hidayat, & Kahar, 2024).

Qualitative observations suggest that students who engage in collaborative digital projects demonstrate greater empathy, critical reflection, and responsibility in their online interactions. However, digital pedagogy remains unevenly distributed; for example, approximately 60% of rural schools still report inadequate digital infrastructure and

inconsistent teacher readiness (Castro, Glewwe, & Montero, 2019). Professional development remains reactive rather than systemic, limiting sustained capacity-building.

Fostering Digital Civic Responsibility and Critical Dialogue

The subject Pancasila and Civic Education (PPKn) has evolved into a platform for promoting rights, responsibilities, and ethical conduct in digital spaces (Musa & Wulan, 2024; Yorman & Sadam, 2025). Through online forums and simulation debates, students analyze social issues and learn democratic participation skills relevant to digital citizenship. Nonetheless, Indonesia's collectivist cultural orientation, which emphasizes social harmony (rukun), sometimes constrains open discussion on controversial issues (Lozano-Díaz & Fernández-Prados, 2020).

Embedding critical digital pedagogy, for example through ethical dilemma analysis or social-media discourse mapping, can balance critical inquiry with respect for communal values. This approach aligns with critical digital literacy theory, which frames technology use not merely as technical competence but as moral, cultural, and civic practice (Demirdöğen et al., 2016).

Systemic Barriers: Infrastructure, Competence, and Context

Despite supportive policy frameworks, digital citizenship implementation faces structural inequities. Infrastructure gaps, limited teacher competence, and lack of culturally responsive materials hinder uniform progress. Unequal access to devices and connectivity continues to widen the digital divide across regions and socioeconomic backgrounds (Helmiatin, Hidayat, & Kahar, 2024; Tan, Wong, & Chen, 2024). Teachers' digital literacy remains inconsistent; many still equate digital education with basic ICT skills rather than critical reasoning or ethical engagement (Davis, Petish, & Smithey, 2006; Farooqi, Amanat, & Awan, 2024).

Localized materials that integrate Pancasila ethics and community wisdom remain scarce. Strengthening home–school–community collaboration (Suprapto & Hartini, 2023; Kodir et al., 2022) and building teacher mentorship networks could foster contextually grounded, sustainable implementation.

Interlinking Digital Citizenship and the Sustainable Development Goals

Advancing SDG 4: Quality Education

Integrating digital citizenship within the Merdeka Curriculum directly supports SDG 4 (Quality Education) by fostering critical thinking, ethical reasoning, and inclusive digital competence (Kioupi & Voulvoulis, 2019). Yet without equitable teacher training and digital access, this agenda risks reinforcing inequality rather than inclusion (Helmiatin, Hidayat, & Kahar, 2024; Aderibigbe et al., 2023). Continuous investment in professional development and digital infrastructure is crucial to sustain inclusive and quality learning environments (Damanik et al., 2025).

Addressing SDG 10: Reduced Inequalities

The digital divide represents a critical obstacle to SDG 10 (Reduced Inequalities). Equal access to devices, networks, and critical digital literacy skills is essential for

democratic participation (Makinde, Sulyman, & Ibrahim, 2024; Tan, Wong, & Chen, 2024). Exclusion from digital learning perpetuates social and economic marginalization (Castro, Glewwe, & Montero, 2019). Community-based digital literacy initiatives and intersectoral partnerships can close this gap by empowering underprivileged learners.

Supporting SDG 16: Peace, Justice, and Strong Institutions

Digital citizenship also underpins SDG 16, promoting peace, justice, and ethical governance. By embedding empathy, respect, and moral integrity into online interactions, schools cultivate digitally responsible citizens (Lozano-Díaz & Fernández-Prados, 2020; Yorman & Sadam, 2025). The Adiwiyata (Green School) framework provides a model for integrating ethics, sustainability, and civic responsibility (Suprapto & Hartini, 2023; Kodir et al., 2022). A proposed Digital Adiwiyata Model could visualize how policy, curriculum, and community participation intersect to foster sustainable digital ethics, linking Pancasila's moral foundation with global digital responsibility (Makinde, Sulyman, & Ibrahim, 2024; Hajj-Hassan, Makki, & Dbaibo, 2024).

Synthesis: Toward a Contextualized Digital Ethics Framework

Across the three SDGs, findings highlight a dynamic interplay between policy coherence, pedagogical innovation, and sociocultural adaptation. While national initiatives align with global frameworks, localized strategies remain critical to bridging the digital divide and embedding ethical awareness in everyday practice. Developing a Critical Digital Literacy-based Adiwiyata Model could institutionalize long-term digital ethics education that integrates environmental sustainability, civic participation, and technological competence within Indonesia's Pancasila-oriented education system.

CONCLUSION

This study concludes that digital citizenship education (DCE) in Indonesian elementary schools is conceptually integrated within the *Kurikulum Merdeka*, *Profil Pelajar Pancasila*, and *Adiwiyata* programs, aligning directly with Sustainable Development Goals (SDG) 4, 10, and 16. The integration of Pancasila ethics with digital and sustainability education establishes a distinctive framework that links moral reasoning, civic responsibility, and technological engagement. However, the findings also reveal ongoing challenges, including uneven teacher competence, limited digital infrastructure, and the absence of localized ethical frameworks, all of which restrict equitable participation and effective implementation. Strengthening teacher competence is therefore essential to realizing SDG 4 (Quality Education) and SDG 10 (Reduced Inequalities). Educational institutions and policymakers should coordinate a national framework that embeds digital ethics and citizenship across curricula, supported by professional development modules such as *"Digital Ethics and Citizenship for Sustainable Learning."* Expanding access to digital infrastructure, particularly in rural regions, remains critical for ensuring inclusive and equitable digital transformation in education.

Although this study provides valuable conceptual insights, it is limited by its reliance on document-based data rather than field observations or direct teacher experiences. Future research should extend this work through comparative or longitudinal studies across

provinces to evaluate how policy integration and teacher training influence the long-term sustainability of digital citizenship practices. Empirical investigations into classroom applications and teacher perspectives would enrich understanding of how ethical and sustainable digital education can be embedded more effectively. These continued efforts are vital for constructing an inclusive, ethically grounded, and future-oriented education system that empowers teachers and students to participate responsibly in Indonesia's digital era.

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AUTHOR CONTRIBUTIONS

Author 1: Conceptualization; Methodology; Formal analysis; Writing original draft; Writing review and editing; Supervision.
Author 2: Data curation; Validation; Visualization; Writing – review and editing.

CONFLICTS OF INTEREST

The author declares no conflict of interest. The research was conducted independently without any financial or institutional influence affecting the study design, data interpretation, or publication decision.

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