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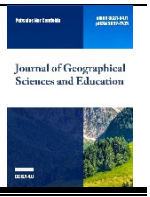

[Review Article]

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The Role of Geography Education in Achieving Education for Sustainable Development

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Abstract

Education for Sustainable Development (ESD) has emerged as a central strategy for addressing interconnected environmental, social, and economic challenges under Sustainable Development Goal 4. While geography education is widely acknowledged as inherently aligned with sustainability principles, limited analytical attention has been given to the structural conditions that shape its transformative capacity. This study critically examines the role of geography education in advancing ESD within contexts marked by persistent educational inequalities. Using a qualitative and conceptual research design based on systematic document analysis of academic literature and international policy reports (2010–2024), the study synthesizes evidence on sustainability competencies, spatial pedagogy, and global education disparities. The findings indicate that geography education contributes to the development of systems thinking, anticipatory competence, normative reflection, and strategic action through spatial inquiry, place-based learning, and geospatial tools. However, its effectiveness is structurally mediated by inequalities in access, teacher preparation, curriculum flexibility, and institutional support. The study advances a conceptual framework positioning geography education as a mediating structure between educational inequality and sustainability competence formation. It concludes that strengthening geography pedagogy, teacher capacity, and equitable institutional conditions is essential for translating ESD from policy aspiration into transformative educational practice.

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Abstrak

Pendidikan untuk Pembangunan Berkelanjutan (PPB) telah muncul sebagai strategi sentral untuk mengatasi tantangan lingkungan, sosial, dan ekonomi yang saling terkait di bawah Tujuan Pembangunan Berkelanjutan 4. Meskipun pendidikan geografi secara luas diakui sebagai sesuatu yang selaras dengan prinsip-prinsip keberlanjutan, perhatian analitis yang terbatas telah diberikan pada kondisi struktural yang membentuk kapasitas transformatifnya. Studi ini secara kritis meneliti peran pendidikan geografi dalam memajukan PPB dalam konteks yang ditandai oleh ketidaksetaraan pendidikan yang terus-menerus. Dengan menggunakan desain penelitian kualitatif dan konseptual berdasarkan

Kata kunci:
pendidikan untuk pembangunan berkelanjutan; Pendidikan Geografi; pembangunan berkelanjutan; pendidikan berkualitas.

analisis dokumen sistematis dari literatur akademik dan laporan kebijakan internasional (2010–2024), studi ini mensintesis bukti tentang kompetensi keberlanjutan, pedagogi spasial, dan kesenjangan pendidikan global. Temuan menunjukkan bahwa pendidikan geografi berkontribusi pada pengembangan pemikiran sistem, kompetensi antisipatif, refleksi normatif, dan tindakan strategis melalui penyelidikan spasial, pembelajaran berbasis tempat, dan alat geospasial. Namun, efektivitasnya secara struktural dimediasi oleh ketidaksetaraan dalam akses, persiapan guru, fleksibilitas kurikulum, dan dukungan kelembagaan. Studi ini mengemukakan kerangka konseptual yang menempatkan pendidikan geografi sebagai struktur mediasi antara ketidaksetaraan pendidikan dan pembentukan kompetensi keberlanjutan. Kesimpulannya, penguatan pedagogi geografi, kapasitas guru, dan kondisi kelembagaan yang adil sangat penting untuk menerjemahkan PPB dari aspirasi kebijakan menjadi praktik pendidikan transformatif.

INTRODUCTION

Against this backdrop of accelerating environmental crises and persistent educational inequalities, the role of education in advancing sustainable development has gained increasing scholarly attention. However, while Education for Sustainable Development (ESD) is widely recognized at the policy level, existing literature often treats geography education in broad or normative terms, with limited analytical attention to the specific mechanisms through which it contributes to sustainability-oriented competencies. Moreover, insufficient integration persists between empirical evidence on global educational inequalities and theoretical discussions of ESD implementation (Yli-Panula et al., 2019; UNESCO, 2022). This gap reveals a critical tension between global sustainability ambitions and the structural constraints of education systems. Without a clearer understanding of how geography education operates within unequal and resource-constrained contexts, policy aspirations for ESD risk remaining declarative rather than transformative.

Accordingly, this study aims to critically examine the role of geography education in advancing the educational objectives of sustainable development by synthesizing global educational inequality indicators with conceptual analyses of sustainability competencies (Meadows, 2020; Pettig & Singer-Brodowski, 2024). By linking secondary empirical data with theoretical perspectives, the study contributes to clarifying the structural, pedagogical, and systemic dimensions through which geography education can either facilitate or hinder the realization of ESD. In doing so, it offers a more integrated framework for understanding the intersection between educational equity, curriculum design, and sustainable development (UNESCO, 2017; Nisa & Windarti, 2024).

International initiatives led by UNESCO and the United Nations have consistently recognized education as a fundamental drive for achieving sustainable development. The adoption of the 2030 Agenda for Sustainable Development places education at the core of global development strategies, particularly through Sustainable Development Goal 4 (SDG 4), where ESD constitutes an implicit yet central dimension, reflected in the goal's emphasis on inclusive and equitable quality education and lifelong learning opportunities (UNESCO, 2017; Angiel & Pokojski, 2019). Education is thus framed not only as a social right but also as a catalyst for environmental protection, economic resilience, and social cohesion.

However, despite this strong normative and policy-level commitment, growing scholarly evidence points to significant limitations in the implementation of SDG 4. In many contexts, sustainability remains marginal within national curricula, often treated as an optional theme rather than a transformative pedagogical framework. Furthermore, systemic challenges such as insufficient teacher preparation, rigid examination systems, resource constraints, and persistent socioeconomic inequalities restrict the translation of global sustainability agendas into meaningful classroom practice. As a result, a clear gap persists between international policy discourse and everyday educational realities. While SDG 4 articulates ambitious goals for inclusive and sustainability-oriented education, its practical integration into teaching

methodologies, curriculum design, and assessment systems remains uneven and frequently symbolic rather than substantive. This policy–practice disconnect raises critical questions about the extent to which current educational systems are structurally equipped to deliver on the transformative promise of ESD.

Within the ESD framework, geography education functions not merely as a relevant field of study but as a key instrument of ESD, given its integrative and interdisciplinary nature. Geography provides learners with essential tools for understanding spatial patterns, environmental systems, and human-environment interactions across multiple scales. By examining issues such as climate change, land use, urbanization, resource management, and population dynamics, geography education enables students to link local experiences with global sustainability challenges. Unlike many other school subjects that address sustainability from a single disciplinary lens, geography uniquely integrates environmental, social, economic, and spatial dimensions within a unified analytical framework, positioning it strategically at the intersection of knowledge integration and real-world problem solving. This spatial and systems-based perspective fosters environmental awareness, critical thinking, and a deeper understanding of the consequences of human actions on natural and social systems (Meadows, 2020; Fariha et al., 2024).

Moreover, geography education contributes significantly to the development of responsible citizenship and environmental stewardship by encouraging learners to engage with real-world sustainability issues. Through place-based learning, fieldwork, and the use of geospatial technologies, students cultivate systems thinking to analyze complex environmental risks, anticipatory competence to assess potential future scenarios, normative competence to evaluate ethical dimensions and sustainability values, and strategic competence to design and participate in informed decision-making processes. These competencies directly align with the sustainability competencies framework articulated, which identifies systems, anticipatory, normative, and strategic competencies as core capacities for advancing sustainable development (Wiek et al., 2011).

Importantly, this pedagogical approach extends beyond knowledge acquisition; it represents a form of transformative learning in which learners critically reflect on existing socio-environmental structures, question dominant assumptions, and develop the capacity to act toward sustainable change. In this sense, geography functions not only as a bridge between scientific knowledge and societal action but also as a transformative educational space that reshapes learners' perspectives, values, and agency in alignment with the goals of ESD (Wiek et al., 2011; UNESCO, 2020).

Despite the growing recognition of ESD at the global policy level, substantial challenges remain in translating sustainability principles into effective educational practices. However, empirical and conceptual research examining how geographical education functions within the framework of ESD remains fragmented and insufficiently developed. While numerous studies acknowledge the relevance of geography to sustainability, limited attention has been given to the specific structural and pedagogical mechanisms through which geography education contributes to sustainability competencies, particularly in contexts characterized by persistent educational inequalities. At the same time, systemic challenges including limited access to quality education, insufficient teacher preparation, curriculum overload, and uneven integration of sustainability themes continue to hinder the effective realization of ESD objectives, especially in low- and middle-income regions.

This reveals a critical research gap: although ESD is widely endorsed at the policy level, there is insufficient analytical understanding of how geography education operates under conditions of structural inequality and how such constraints shape its capacity to deliver transformative sustainability learning. Addressing this gap is essential for moving beyond normative advocacy toward evidence-informed educational reform. These disparities undermine the capacity of education systems to foster sustainability-oriented competencies and to support equitable development outcomes (Huckle & Wals, 2015; Crespo Castellanos et al., 2021).

Against this backdrop, the present study seeks to critically examine the role of education, specifically geography education in advancing the educational objectives of sustainable development. While these goals are well established, academic contributions to

understanding geography education's specific mechanisms, challenges, and impacts in this context remain general and underdeveloped. This study aims to fill these gaps by providing empirical insights and theoretical analysis on the integration of sustainable development principles within geography curricula and pedagogical practices (Lotz-Sisitka et al., 2015).

The study adopts a qualitative and conceptual research approach, drawing on an analytical review of academic literature and international educational reports. By synthesizing existing knowledge, this study pursues three specific objectives: 1) to analyze how geography education aligns conceptually with the sustainability competencies framework articulated by Wiek et al. (2011); 2) to examine how structural educational inequalities influence the capacity of geography curricula to operationalize ESD; and 3) to identify the systemic and pedagogical conditions necessary for integrating transformative sustainability learning within geography education.

Theoretically, the study contributes by advancing an integrated analytical framework that links geography education, sustainability competencies, and structural educational inequality, an intersection that remains underexplored in existing ESD literature. By moving beyond normative advocacy, it situates geography within a critical systems perspective that explains both its potential and its institutional constraints. Practically, the research provides policy-relevant insights for curriculum developers, teacher education programs, and educational decision-makers by identifying actionable leverage points such as teacher capacity building, curriculum redesign, and equitable resource allocation necessary to translate ESD principles into effective classroom practice. Unlike previous studies that treat geography education as inherently supportive of sustainability, this study demonstrates that its transformative capacity is structurally conditioned by systemic educational inequalities. Furthermore, it offers a strategic roadmap for regional stakeholders to align local geography curricula with global sustainability targets while addressing specific socioeconomic barriers to learning. This study also underscores the necessity of establishing data-driven monitoring mechanisms to evaluate how structural interventions improve the delivery of sustainability competencies in diverse educational settings

LITERATURE REVIEW

Conceptualizing Sustainability in Educational Contexts

Sustainability refers to the capacity to meet present needs without compromising the ability of future generations to meet their own needs. This widely accepted concept encompasses three interrelated dimensions environmental, economic, and social sustainability, aiming to achieve a balanced and integrated approach to long-term development (UNESCO, 2021; Trivedi et al., 2024).

Environmental sustainability focuses on conserving natural resources, protecting biodiversity, and reducing environmental degradation through measures such as lowering carbon emissions and promoting renewable energy use (Fariha et al., 2024). Economic sustainability emphasizes the efficient use of resources to support long-term economic growth while minimizing negative environmental impacts and ensuring economic viability (Young, 2013; Nisa & Windarti, 2024). Social sustainability, in turn, addresses issues of equity, social justice, and quality of life, highlighting the importance of education, healthcare, gender equality, and inclusive community participation (Hawa et al., 2021).

From a geographical perspective, sustainability is examined through the interaction between human activities and natural systems. Geography education contributes to sustainability by analyzing spatial patterns of urbanization, agriculture, and industrial development, and by promoting environmentally responsible decision-making within the framework of sustainable development (Göcen, 2021; Yang & Solangi, 2024).

The Role of Education and Geography in Achieving the Educational Goals for Sustainable Development

Education plays a pivotal role in realizing the educational goals for sustainable development, particularly SDG 4, which aims to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all. By empowering individuals with knowledge, skills, and values, education functions as a transformative force that supports sustainability-oriented behaviors and decision-

making (Crespo Castellanos et al., 2021; Hawa et al., 2021).

Geography, as an academic discipline, complements this objective by fostering an understanding of the interconnectedness between people, places, and ecosystems, enabling learners to comprehend the global implications of local actions (Elfert, 2021). Through its integrative nature, geography education enhances spatial awareness and helps learners understand the interactions among environmental, social, and economic systems (Angiel & Pokojski, 2019; Meadows, 2020).

Education also serves as a catalyst for sustainable development by equipping individuals with the knowledge and skills necessary to address global challenges such as climate change, poverty, and inequality (UNESCO, 2021). Furthermore, education promotes awareness and empowerment, enabling individuals to make informed decisions, drive innovation, and actively participate in societal development (Onesi-Ozigagun et al., 2024). Ensuring equity and inclusivity in access to quality education is therefore essential for reducing disparities and achieving sustainable progress (Ainscow, 2020).

Geography education contributes to the achievement of educational goals for sustainable development through several key pathways. These include contextualizing learning within local and cultural settings to enhance relevance and applicability (Larsen et al., 2022; Nagata, 2025) promoting environmental stewardship through the understanding of geographical patterns and ecological systems (Purwanto et al., 2022; Pranzini et al., 2024), and supporting experiential learning approaches such as fieldwork and community engagement (Montiel-Hernández et al., 2024). In addition, the integration of geographic principles into curriculum development fosters a holistic understanding of sustainable development, while the use of technological tools such as Geographic Information Systems (GIS) enhances students' ability to analyze and address sustainability-related challenges (Pérez-delHoyo et al., 2020; Nguyen et al., 2024).

Despite these opportunities, several barriers hinder the effective implementation of ESD, including limited access to quality education in underprivileged regions and insufficient integration of sustainability themes into educational curricula. Nevertheless, cross-disciplinary approaches that combine education, geography, and technology offer significant potential to accelerate progress toward achieving SDG 4 and advancing ESD (Sinha & Lutchman, 2021; Rahmatulloh et al., 2023).

METHOD

This study employs a qualitative and conceptual research design, utilizing systematic document analysis to synthesize existing literature and policy frameworks. To ensure transparency, objectivity, and methodological rigor, the document selection process followed a structured procedure adapted from the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The review was specifically focused on academic and institutional publications released within 14 years, from 2010 to 2024, to capture the evolution of discourse surrounding sustainability in education. The systematic selection process was executed in three primary phases, as illustrated in Figure 1:

The initial search was conducted across prominent academic databases, including Scopus, Web of Science, and Google Scholar, which yielded a total of 146 records. To ensure a holistic perspective that bridges academic theory and global policy, this search was complemented by the retrieval of 34 internationally recognized reports and assessments from key global organizations, namely UNESCO, the World Bank, OECD, the United Nations (UN), and UNHCR.

A total of 180 records (146 database records and 34 register records) were initially identified. After the removal of 22 duplicate entries, 124 unique records remained for screening. These records were subjected to a rigorous title and abstract screening process to determine their alignment with the research objectives. This stage resulted in the exclusion of 86 records that did not meet the thematic focus of the study.

Following the screening phase, 38 reports were sought for full-text retrieval. However, 6 reports could not be accessed, leaving 32 full-text documents to be assessed for eligibility. During this critical evaluation, 14 documents were excluded based on predefined criteria: 8 reports were excluded for not directly addressing ESD or SDG 4, while 6 others were

removed due to limited analytical relevance or lack of focus on core competencies.

Ultimately, 18 high-quality studies and reports met all eligibility requirements and were retained for synthesis. To ensure the consistency of this selection, specific inclusion and exclusion criteria were applied. Documents were included if they: 1) were published in English or Indonesian between 2010 and 2024; 2) focused on ESD or the implementation of SDG 4; 3) specifically addressed geography education or the development of sustainability competencies; and 4) provided peer-reviewed empirical or authoritative policy frameworks.

Conversely, exclusion criteria were applied to filter out: 1) publications appearing before 2010 to ensure the relevance of the data to current global agendas; 2) studies that only mentioned sustainability superficially without providing conceptual or pedagogical depth; 3) opinion pieces, blog posts, or non-academic articles that lacked a rigorous peer-review process; and 4) full-text documents that were behind restrictive paywalls or otherwise inaccessible during the retrieval phase. This rigorous selection process aims to minimize the risk of publication bias and maintain the validity of the synthesized findings. Consequently, the selected articles provide a solid theoretical and practical foundation for addressing the challenges of integrating ESD into the contemporary geography curriculum.

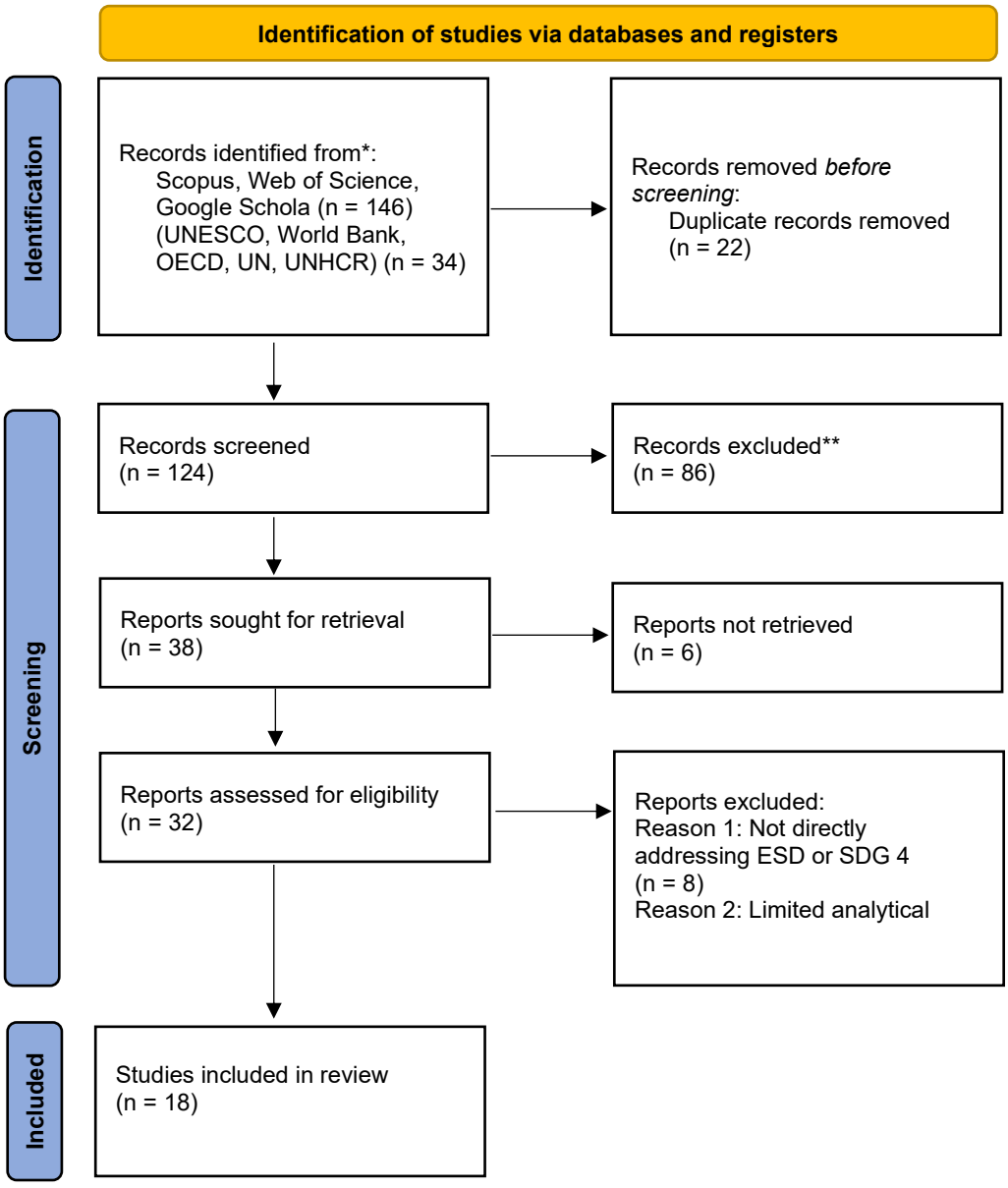

Figure 1. PRISMA-Style Flow Diagram of the Document Selection Process

RESULT AND DISCUSSION

The systematic review of the 18 selected studies and reports revealed a series of critical global indicators that define the current landscape of educational inequality. These indicators span across various dimensions, from foundational literacy and early childhood access to tertiary completion rates and lifelong learning skills. The analysis demonstrates that structural disparities driven by socioeconomic status, geographic location, and national income levels act as significant barriers to the effective implementation of ESD. To provide a comprehensive overview of these findings, the key patterns of inequality and their specific relevance to sustainability goals are synthesized highlighting the persistent gaps that challenge the achievement of inclusive and equitable quality education as envisioned in SDG 4 (Table 1).

Table 1. Key Global Indicators of Educational Inequality Relevant to ESD

Educational Level/Domain	Indicator	Key Pattern Reported in International Studies	Relevance to ESD
Primary & secondary education	Children and youth out of school (2022)	Approximately 263 million children and youth remain out of school globally, with higher concentrations in low-income regions.	Exclusion from basic education undermines foundational sustainability literacy and equal participation.
Tertiary education	Completion rates by income group (2018–2022)	Completion rates vary sharply by national income level, with substantially lower attainment in low-income countries.	Unequal access to higher education limits the development of advanced sustainability competencies.
Learning outcomes	Grade 3 reading proficiency (TERCE, Latin America)	Approximately 60% of students reach minimum reading proficiency, with significant disparities across countries. These gaps reflect cumulative structural inequalities, including unequal access to early childhood education, socioeconomic disadvantages, language-of-instruction barriers, and disparities in teacher preparation.	Foundational literacy is not only an academic benchmark but a prerequisite for critical thinking, problem-solving, and sustainability-related learning. Weak literacy outcome's function both because of systemic inequality and as a constraint that limits learners' ability to engage with complex sustainability challenges, thereby reducing the transformative capacity of ESD implementation.
Early childhood education	Availability of free and compulsory pre-primary education	Only a limited number of countries guarantee at least one year of free pre-primary education.	Early educational inequality reinforces long-term disparities in learning and sustainability awareness.
Early childhood access	Enrollment gap by household wealth	Children from the wealthiest households are significantly more likely to enroll in early childhood education.	Socioeconomic gaps contradict ESD principles of equity and inclusion.
Higher education inequality	Tertiary completion by wealth (ages 25–29)	Completion remains concentrated among the richest population groups in many countries.	Education systems reproduce social inequality rather than promoting social mobility.
Adult education	Adult participation in formal	Adult participation in formal education varies widely across contexts.	Lifelong learning is essential for sustainability transitions.

Educational Level/Domain	Indicator	Key Pattern Reported in International Studies	Relevance to ESD
	education (EU, 2018)		
Skills for employment	Digital, mathematical, and financial skills.	Significant shares of adults lack essential digital and financial skills.	Skills gaps hinder inclusive and sustainable economic development.

Based on Table 1 synthesizes key global patterns of educational inequality across different stages of the education system, drawing on internationally reported indicators rather than statistical testing. The evidence consistently demonstrates that access to, participation in, and completion of education remain strongly stratified by income level, region, and social background. Such disparities are widely recognized in the literature as structural barriers to the realization of ESD (Tilbury, 2011; UNESCO, 2020). This is reflected, for example, in the persistence of approximately 263 million children and youth remaining out of school globally, in the finding that only around 60% of Grade 3 students in Latin America reach minimum reading proficiency levels, and in the pronounced disparities in tertiary completion rates and participation in technical and vocational education across income groups. These indicators collectively illustrate how foundational access gaps, uneven learning outcomes, and stratified post-secondary opportunities are interconnected manifestations of systemic educational inequality that constrain the transformative potential of ESD.

At the foundational levels of education, large numbers of children and youth remain excluded from schooling, particularly in low-income contexts. Previous studies emphasize that early exclusion from education undermines not only learning outcomes but also long-term capabilities, social participation, and environmental awareness, which are central objectives of ESD (UNDP, 1990; UNESCO, 2017). Similarly, disparities in early childhood education enrollment reflect unequal life chances from the outset, reinforcing intergenerational cycles of disadvantage that contradict the principles of equity and inclusive development embedded in SDG 4.

At the secondary and tertiary levels, the observed gaps between income groups mirror findings from comparative education research, which consistently links higher education attainment to socioeconomic status rather than merit alone (Bourdieu, 1986; World Bank, 2018). Such inequalities limit the development of sustainability-related competencies, including critical thinking, problem-solving, and civic engagement, all of which are essential for advancing sustainable societies.

Adult education and skills development indicators further highlight persistent inequities in lifelong learning opportunities. Existing research on ESD stresses that sustainability transitions require continuous learning across life courses, particularly in relation to digital, financial, and vocational skills. As reflected in Table 1, significant shares of adults lack essential digital and financial skills, indicating that a considerable proportion of the adult population remains insufficiently prepared to participate in a knowledge-based and environmentally responsible economy. These skills gaps are not merely technical deficiencies; they represent structural barriers that limit individuals' capacity to access green employment, engage in sustainable consumption practices, and adapt to technological and environmental transformations. Consequently, uneven access to lifelong learning reinforces broader educational inequalities and constrains the systemic implementation of ESD (OECD, 2019; UNESCO, 2021).

When access to adult education remains uneven, the transformative potential of education for promoting sustainable development is significantly constrained. Taken together, the patterns summarized in Table 1 reinforce the view that educational inequality is not merely a social issue, but a fundamental challenge to education as a human right and as a driver of sustainable development. Addressing these disparities is therefore essential for aligning educational systems with the normative goals of justice, human dignity, and

sustainability articulated in global development agendas.

Beyond the direct indicators of educational inequality, the systematic review further identified critical dimensions of systemic preparedness and structural constraints that influence the scalability of sustainability education. While Table 1 outlines the disparities in educational access and outcomes, achieving the transformative goals of ESD requires a robust institutional framework, adequate financing, and qualified human resources. The analysis reveals that even where access is provided, the quality of delivery is often hampered by significant gaps in teacher training, inadequate school infrastructure, and insufficient public spending on education.

The synthesized evidence regarding these systemic barriers and their direct implications for ESD is detailed in Table 2. These factors represent the "preparedness gap" that many nations must bridge to foster a truly inclusive and resilient educational ecosystem capable of supporting sustainable transitions.

Table 2. Key Indicators of Educational Preparedness and Systemic Constraints Relevant to ESD

Thematic dimension	Indicator	Synthesized evidence from international reports	Implications for ESD
Equity & access	Secondary education completion gap	Large disparities persist between the richest and poorest population groups in low-income contexts.	Limits equitable access to sustainability-oriented knowledge and skills.
	Refugees and marginalized learners	High proportions of refugee children and youth remain out of school, particularly at the secondary level.	Exclusion contradicts rights-based and inclusive principles of ESD.
Lifelong learning	Adult literacy participation	Adult participation in literacy programs remains very low in the poorest countries.	Constrains lifelong learning essential for sustainability transitions.
Teacher quality	Teacher training and qualifications	Significant gaps remain in teacher training, especially in early and secondary education.	Limits the effective delivery of learner-centered and ESD-oriented pedagogy.
Learning environment	School infrastructure and safety	Many schools lack basic water facilities or operate in insecure conditions.	Undermines safe, healthy, and inclusive learning environments.
Governance & financing	Public education spending	Education expenditure remains below internationally recommended levels in many countries.	Restricts system-wide capacity for ESD reform.
International support	Education aid gap	Persistent and growing financing gaps in international education aid.	Slows progress toward SDG 4 and ESD implementation.

Based on Table 2 highlights a set of interrelated indicators that reflect systemic constraints affecting educational preparedness for ESD. Rather than representing isolated challenges, these indicators collectively reveal structural inequalities that limit the capacity of education systems to promote equitable, inclusive, and sustainability-oriented learning (Tilbury, 2011; UNESCO, 2020). From an equity and access perspective, disparities in secondary education completion between the richest and poorest population groups remain particularly pronounced in low-income contexts (World Bank, 2018; UNESCO, 2020). Such inequalities are widely recognized as barriers to ESD, as unequal access to post-primary education restricts opportunities for acquiring higher-order cognitive skills, critical thinking, and sustainability-related competencies (Tilbury, 2011; OECD, 2019).

The situation is further exacerbated for vulnerable groups, including refugees and learners educated in languages they do not fully master. In many multilingual and low-income contexts, the language of instruction is determined by national policy and often reflects

colonial legacies or dominant linguistic groups rather than learners' mother tongues. As a result, large proportions of students are systematically taught in unfamiliar languages, which weakens comprehension, limits classroom participation, and reduces the effectiveness of sustainability-related learning. This structural misalignment between language policy and learner background reinforces educational inequality and undermines the inclusive and rights-based principles underpinning sustainable development (UNDP, 1990; UNHCR, 2022).

Indicators related to foundational skills and literacy reveal additional preparedness gaps. Low participation in adult literacy programs and persistently high levels of illiteracy, particularly among women and young people, suggest that lifelong learning systems remain insufficiently developed (OECD, 2019; UNESCO, 2021). Since ESD emphasizes learning across life, weaknesses in adult education constrain societies' ability to adapt to environmental, social, and economic transformations (UNESCO, 2017). Teacher quality and learning conditions emerge as another critical dimension of educational preparedness. In several regions, especially in Sub-Saharan Africa, a substantial share of teachers lacks adequate professional training, while deficiencies in basic school infrastructure, such as access to water and safe learning environments, further compromise educational quality (World Bank, 2018; UNESCO, 2020). These conditions limit the effectiveness of teaching and reduce schools' capacity to foster participation, learner-centered approaches central to ESD (Tilbury, 2011; OECD, 2019). Finally, financing constraints represent a cross-cutting governance challenge that amplifies existing inequalities. Insufficient public investment in education, combined with declining international education aid, restricts governments' ability to expand access, improve quality, and invest in sustainability-oriented reforms (World Bank, 2018; UNESCO, 2020).

However, these funding gaps are not merely technical budgetary shortfalls; they reflect broader governance dynamics, including limited fiscal space in low-income countries, high debt burdens, and competing national priorities such as security, infrastructure, or short-term economic stabilization. Such structural constraints shape how governments allocate resources and contribute to the uneven implementation of SDG 4 commitments across contexts. As a result, disparities in education financing translate into unequal institutional capacity to integrate ESD, reinforcing systemic inequalities and limiting the transformative potential of education as a driver of human development, social justice, and sustainable development. (UNDP, 1990). Overall, the patterns synthesized in Table 2 demonstrate that gaps in educational preparedness are deeply systemic. Addressing these challenges requires integrated policy responses that simultaneously strengthen equity, teacher capacity, learning environments, and financing mechanisms to align education systems with the goals of ESD (Tilbury, 2011; UNESCO, 2020).

CONCLUSION

The present study confirms that education forms a human-centered foundation essential for sustainable development, positioning it as both a fundamental human right and a strategic catalyst for social justice, environmental stewardship, and sustainable futures. Specifically, the research highlights the pivotal role of geography education in advancing ESD by enhancing learners' spatial thinking, environmental literacy, and critical understanding of human-environment interactions. The analysis reveals that effectively integrating geography education into formal curricula can foster the development of sustainability competencies necessary for addressing complex environmental and social challenges. Furthermore, the study emphasizes the urgent need to invest in targeted teacher training programs that equip educators with the skills and knowledge to deliver ESD content effectively. Strengthening institutional frameworks and policies that support inclusive and equitable education is also critical to overcoming persistent educational inequalities, which continue to hinder progress toward achieving sustainable development goals.

By linking secondary data synthesis to conceptual insights, this study contributes to the ESD and geography education literature by elucidating the systemic challenges and opportunities at the intersection of educational equity, curriculum design, and capacity building. These findings underscore the importance of designing context-sensitive curricula and professional development initiatives that align with ESD principles and local educational realities. Future empirical research is

recommended to explore the practical implementation of geography-based ESD programs across diverse educational settings, assessing their impact on learner outcomes and sustainability practices. Such research will provide valuable evidence to inform policymaking, curriculum development, and teacher education, ultimately strengthening the role of education as a driver of sustainable development. Geography education should therefore be understood not as a supplementary contributor to ESD, but as a structurally embedded arena in which the viability of sustainability transformation is negotiated.

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