



Greening Education: A Framework for Sustainable Development Integration in Education Systems

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ABSTRACT

Greening Education represents a transformative shift in educational paradigms, aiming to embed sustainability values, ecological literacy, and social responsibility into curricula. Rooted in systems thinking, lifecycle perspectives, and learner empowerment, this holistic approach equips students to address complex, interconnected environmental challenges. Centered on developing nations such as Pakistan, this paper explores the theoretical foundations, pedagogical strategies, institutional roles, and policy measures necessary for integrating sustainable development into education. Drawing on global and regional evidence, it highlights both opportunities and challenges, offering actionable insights for scholars, policymakers, and practitioners committed to advancing climate-resilient education.



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1. Introduction

Global environmental crises, including climate change, biodiversity loss, resource depletion, and pollution, have increased in both magnitude and frequency, threatening ecological integrity, social equality, and economic stability. The world community has promoted sustainable development as a cohesive framework to reconcile current needs with the ability of future generations to fulfil their own (Middleton, 2024)(World Commission on Environment and Development, 1987). Education has a crucial role to play in this process, as both a driver and a foundation for development of the knowledge, skills, values, and attitudes needed for sustainable development (United Nations Educational, 2024). In this context, Greening Education has been presented as an innovative approach that aims to infuse the principles of environmental sustainability deeply and systematically into all levels and sectors of education.

Greening Education is more than green environment education because it integrates sustainability into curriculum content, pedagogy, institutional practices, and community involvement. It advocates for a cohesive, interdisciplinary methodology aimed at fostering ecological literacy, critical thinking, ethical consciousness, and engaged citizenship in pupils. This paradigm focuses on systems thinking, life cycle consciousness, and learner agency, allowing the student to comprehend and address the complex, interconnected aspects of sustainability issues. Greening Education is closely aligned with the United Nations Sustainable Development Goals (SDGs) and is a utilitarian and theoretical guideline to enable action on climate action, environmental stewardship, and social justice at the global level (United Nations Educational, 2024; Voulvoulis et al., 2022). In the developing world,

environmental degradation is especially prone to go hand in hand with socio-economic vulnerability, which makes the vulnerable populations and weak ecosystems especially susceptible to the environment (Educating the Planet Para 3). Countries such as Pakistan have extreme issues of water pollution, deforestation and a decline in the quality of air in the city, which are supported by the restriction of policies implementation, infrastructure, and lack of material to be taught to children in schools. These issues are also opportunities to apply Greening Education in order to empower learners as changemakers and creating resilient and sustainable communities. This is not only to be carried out by changing the curriculum but also by good institutional commitments, capacity building and involving all the stakeholders (World Wide Fund for Nature, 2023).

The purpose of the study is the introduction of a holistic theoretical and practical Greening Education model based on the existing literature and the international best practices and paying attention to the dynamics of the emerging environment. It examines the intellectual suppositions, pedagogical approaches, implementation and policy suggestions, that are required to be able to integrate sustainability in the education systems meaningfully. The study objective is to add into the body of knowledge that can inform the transformation of education to sustainability in terms of including information and experience in international declarations, academic writing and case studies. Overall, it believes it can advise educational institutions, policy makers and professionals to develop and implement successful Greening Education programs to impart knowledge, beliefs and practices that can support a sustainable future.

2. Literature Review

Studies of Education for Sustainable Development (ESD) and linked green education initiatives show growing understanding of how education can lead to overall sustainability outcomes. UNESCO's Greening Curriculum Guidance (2024) provides a systematic approach that emphasizes pedagogy for transformation, context-aware content, and continuous professional development with strong focus on building climate action competencies. It supports learner-centric, culturally relevant, and action-focused teaching approaches that connect knowledge to real-life community experiences.

The Talloires Declaration (1990)—an early pledge by global university leaders—highlights the critical contribution of higher education institutions to achieving sustainability. It calls for the integration of ecological literacy into curriculum and organizational practice to counteract environmental degradation (University Leaders for a Sustainable Future [ULSF], 2015). This international movement continues to inspire policy change and study regarding the contributions of academic institutions toward achieving the Sustainable Development Goals (SDGs) (Sharma, 2025).

Systems thinking provides an underlying theoretical foundation for Greening Education, encouraging understanding of complex interdependencies and feedback mechanisms in natural and social systems (Hutchison, 2019; Voulvoulis et al., 2022). Systems thinking, through interdisciplinary overlap, enables students to investigate the underlying reasons and far-reaching implications of environmental behavior, thereby reinforcing problem-solving and policy-making skills (The Systems Thinker, 2015).

Along with this perspective, lifecycle and societal role theories envision education for sustainability as a continuous, socially integrated process. Research indicates that learning strategies must be adjusted to the development phase of the learners and include socialisation processes both with families, peers and community organisations (Sanchez et al., 2025).

These approaches to teaching encourage long term engagement and moral inclinations to sustainable behaviour. Personal agency and transformative learning are also highlighted, asserting that learners need to develop self-efficacy, critical reflection, and ethical decision-making skills in order to perform as agents of sustainability within their communities and occupations (Persico, Manca, & Pozzi, 2012; Trevisan, Leal Filho, & Pedrozo, 2024). This is in accordance with the modern needs of the educational paradigm not just to produce knowledge but also values and promises to environmental stewardship.

In developing nations, such as Pakistan, empirical analysis identifies advancements in environmental education policy but mentions challenges of implementation on account of a lack of funds, teacher training, and mainstreaming across formal and non-formal education sectors (World Wide Fund for Nature, 2023). Non-governmental responses and collaborations provide promising models, but mainstreaming at a systemic level is a priority area.

The Greening Education framework rests on three interconnected pillars which together further sustainability literacy and student agency: Systems Thinking, Life Cycles and Societal Roles, and Self as Agent. This theoretical setup draws from environmental education, transformative learning, and sustainability science literature to offer a secure platform for curriculum design and institutional practice.

3. Systems Thinking

Systems thinking is a pedagogical and cognitive method vital to grasping the interconnectedness of sustainability challenges. It helps the learner see and understand the environment as interdependent socio-ecological systems rather than discrete entities (Voulvoulis et al., 2022). It shows the feedback loops, time delays, and unforeseen outcomes, leading to a better understanding of environmental issues such as pollution, climate change, and resource depletion (Hutchison, 2019). Through systems thinking in education, students learn critical thinking that cuts across disciplinary boundaries and enables them to design sustainable solutions at the local, regional, and global levels (The Systems Thinker, 2015).

3.1. Life Cycles and Societal Roles

The 2nd dimension focuses on the need to acknowledge the social condition and the level of development of the students in sustainability education. Environmental knowledge and values are defined during the lifelong process and influenced by the process of family, community, and institutional socialisation (Sanchez et al., 2025). To enable meaningful and long-term interactions with the concepts of sustainability, pedagogical approach must be adapted to these environmental conditions.

Sustainable education is not a single event and education is a long process. It is the acquisition of the skills to comprehend ecological effects, foster resilience in the community, and be involved in societal decision-making in the life course. This life long methodology reacts to the multiple needs of students hence increasing the relevance of education and inclusivity to sustainability (Levinson, 1978).

3.2. Self as Agent

The 3rd dimension focuses on the individual as an active contributor to sustainability and therefore includes personal responsibility, moral thinking, and change. Education must empower learners to critically assess environmental issues, make informed decisions, and collaborate effectively for significant change (Trevisan, Leal Filho, & Pedrozo, 2024). The agency viewpoint aligns with transformative learning theory, which highlights alterations in worldview and behaviour as essential for sustainability (Persico, Manca, & Pozzi, 2012).

Developing self-efficacy and moral accountability will enable students to be agents and practitioners of sustainability in their personal, professional and civic lives. It promotes the motivation and skill needed to tackle complex environmental and social issues in flexible and creative solutions.

3.3. Broadening Students' Education

The enlargement of learning by students is a basic strategy in the greening education model to transcend the traditional disciplinary boundaries and encourage transmedia and intermedia approaches to sustainability. This perspective values diversity amongst student groups, and seeks to engage learners with diverse academic backgrounds, such as those working in the sciences, humanities, and professional courses. The complexity of the interactions that occur between natural, social and economic systems is taken up by multidisciplinary approach where sustainability education is used as a holistic approach in bringing students together. This expansive education would see to it that they not only

graduate as professionals in their fields, but they would also graduate as well versed citizens of the world who can step up to debates on other fronts. This increased education helps to think critically and make ethical decisions and understand the world- skills, which are critical in the context of successful participation in sustainable development projects (Gkargkavouzi & Halkos, 2025; United Nations Educational, 2024).

3.4. Environmental Literacy

Environmental literacy is one of the aims of green learning and this serves to emphasise the importance of not merely learning about ecological systems in a factual sense but also the need to learn emotional and behavioural skills to have the ability to be a steward of the environment in an ecologically sustainable way. It is the intellectual understanding of the principle ideas in ecosystems, climate change, resources cycles, pollution, and biodiversity. However, they require not only facts, children should be taught to have emotional attachments to environmental problems, which would lead to an empathetic attitude and normative admiration of nature. These dimensions are reinforced by the development of behavioural competence which teaches the learners to transfer knowledge, values in long term activities at individual, community, and institutional levels. By introducing environmental literacy into school curriculums, one can help students to have a critical look at environmental problems and create a community of resilience and sustainability-conscious people (Orr, 1994; Voulvoulis et al., 2022).

3.5. Decision-Making Integrity

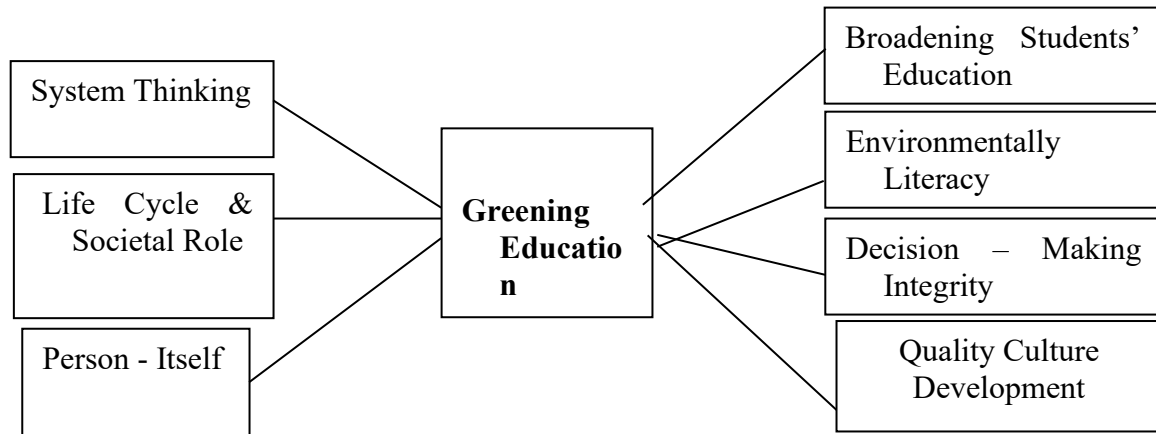
Another important ethical element of the sustainability education is the integrity of decision-making and aims to advance honesty, accountability, transparency, and inclusion in the assessment of environmental and social effects of choices. It necessitates the development of learners' ability to critically assess the ethical underpinnings of their decision-taking into account equity, justice, and the perspectives of marginalised communities. Enhancing ethical awareness equips students to manage the intricate trade-offs associated with sustainability issues and to acknowledge accountability for the enduring consequences of their activities. This fosters ethical sensitivity, trustworthiness, and teamwork in tackling ecological challenges at local, national, and global scales. Incorporating integrity into decision-making fosters the emergence of future leaders and citizens dedicated to maintaining social and environmental justice during sustainable transitions (Sharma, 2025; Trevisan, Leal Filho, & Pedrozo, 2024).

3.6. Quality Culture Development

Fostering a quality culture is crucial for integrating sustainability as a fundamental institutional value in educational environments. This culture demonstrates a systematic dedication to ongoing enhancement, innovation, and accountability in sustainability teaching, operations, research, and community involvement. It requires implementing the sustainability standards into the quality assurance mechanisms, professional training of instructors and support staff on sustainability skills, and promoting participatory governance that involves various stakeholders. It also focuses on open governance, interdisciplinarity and building partnerships to support the further sustainable contribution of the institution beyond the campus. By means of constant monitoring, assessment, and gradual enhancement, institutions can create environments, in which sustainability will be integrated in teaching and operational processes. This kind of systematic embedding would make sustainability learning agile, sensitive to new problems, and consistent with the developmental agendas worldwide (Rebelatto et al., 2019).

4. Theoretical Framework

Figure 1: Greening Education and its role in developing countries



5. Methodology

This study employs the conceptual analysis and systematic literature review based qualitative study design to formulate an integrated Greening Education framework that is specifically aimed to be used in the context of developing Pakistan. Qualitative methods offer an appropriate conceptual framework to describe the multidimensional and complex character of sustainability education due to its exploratory nature of synthesis of knowledge, theories, and evidence rather than the creation of primary data (Creswell & Poth, 2016; Flick, 2018).

The process of gathering data was primarily based on a systematic desk review of the academic literature, international policy reports, organizations statements and program evaluations concerning the program Education for Sustainable Development (ESD) and the program Greening Education. The main sources were the policy guidelines of the United Nations Educational, Scientific and Cultural Organisation (UNESCO) (United Nations Educational, 2024), the Talloires Declaration (University Leaders for a Sustainable Future, 2015), peer-reviewed literature and the grey literature of government and non-governmental organisations (World Wide Fund for Nature, 2023). Through the analysis of the extensive documents, the research identified major themes, guiding principles and best practices that were essential in the development of effective frameworks of sustainability education. An intense keyword search method was used across major scholastic databases like Scopus, Web of Science, and Google Scholar, covering literature published between 2000 and 2025. Search terms included "Greening Education," "sustainability education," "environmental education in developing nations," and similar variations (Sanchez et al., 2025; Voulvoulis et al., 2022).

Severe inclusion and exclusion criteria were enforced to ensure relevance—picking studies that provide significant frameworks, conceptual models, or empirical analysis of greening education, but excluding sources that focus solely on environmental science with no educational implications or opinion pieces without empirical support (Miles, Huberman, & Saldana, 2014). Thematic coding followed data collection to define recurring motifs and deep theoretical constructs from the sources (Braun & Clarke, 2006). These codes were amalgamated through an iterative process of cross-comparisons and ideas integration, allowing the formation of a robust theoretical framework informed by systems thinking, life cycles and social roles, learner agency, and institutional strategy (Persico, Manca, & Pozzi, 2012; Trevisan, Leal Filho, & Pedrozo, 2024).

Contextual understanding—particularly regarding the socio-economic conditions and policy landscapes of developing countries such as Pakistan—were included to ensure the framework's relevance and adaptability to local challenges and opportunities (Abadtak, 2023; Malik, 2004). Based on the methodological strength of the literature review and conceptual synthesis, this research does not exclude the possibility of admitting its limitations in the absence of primary empirical data collection that entails interviews, surveys, or observational studies. Thus, the developed model is an evidence-grounded theoretical framework that will be empirically validated by the future study to prove its effectiveness, flexibility, and ability to be used in various educational contexts (Creswell & Poth, 2016).

6. Discussion and Analysis

The Greening Education The process of education system integration In the modern world is a revolution to support the pressing global environmental concerns of climate change, biodiversity loss, and resource depletion. The study investigates the pivotal issue of integrating the concept of sustainability into the methods of the curriculum, pedagogy, institutional organization, and outreach to the community with the emphasis on the association between the theoretical frameworks and practice.

Recent policy discussions and studies highlight the need to have multi-disciplinary approach to sustainability education urgently. According to the UNESCO Greening Curriculum Guidance (2024), effective greening education should not be confined to the disciplinary perspectives of specific studies, but promote cross- and transdisciplinary studies that promote the holistic cognitive abilities of students, their socio-emotional well-being, and behavioural proficiencies. Such a method will mean that the students will not only be taught about climatic science and ecological relations but also be trained to develop answers in most contexts in a manner that they would be responsible and creative (Gkargkavouzi & Halkos, 2025; United Nations Educational, 2024). The combination of intellectual, emotional and behaviour learning leads to climatic preparedness, which provides children with self-efficacy and critical problem solving skills required in environments that are sustainable. In this pedagogy systems thinking is an essential teaching and conceptual tool. Systems thinking supports integrated awareness and integrative problem-solving capacity through the promotion of understanding socio-ecological feedback loops, complexity, and interdependencies (Hutchison, 2019; Voulvoulis et al., 2022). It is through the emergence of systems literacy that students are able to be able to view the twists and turns of implications of environmental decisions including the socio-economic and intergenerational consequences -abilities needed to solve coupled environmental problems and envision sustainable futures. Understanding education as a process is also important and contextually adaptive and comprehensive.

Lifecycle paradigm of education focuses on the necessity to proceed with an idea of sustainability by using a spectrum of their levels of development, such as the forces of socialisation and cooperation with the community (Sanchez et al., 2025). This school of thought recognizes the fact that students can develop their knowledge, beliefs and behaviors based on their social settings; therefore, education must be culturally aware and based in the local context. It is the combined collapse of indigenous epistemologies and pedagogies of place that enables the empowerment of greening education through valuing the diversity of systems of knowledge and facilitating the inclusive care of the environment (Onyeaka and Akinsemolu, 2024). Another one is that sustainability education cannot be distilled to the ethical dimension of sustainability which is reflected in the concept of integrity as a decision-making skill. The moral intelligence and conscience among the learners will ensure that the moral aspects of justice, equity and inclusiveness will be the driving force in the environmental practices. This ethical ground play is important in the righting of socio-political inequalities that are at the core of the sustainability issue especially the climate justice issue (Sharma, 2025; Trevisan, Leal Filho, & Pedrozo, 2024). At the institutional level, the quality culture that integrates the long-term sustainability as a mission and working principle is paramount in achieving the sustainable effect of the greening of educational projects. The policies that promote professional development, interdisciplinarity of research, engagement of stakeholders, and straightforward quality assurance processes maintain this culture (Rebelatto et al., 2019).

Post-secondary education institutions are particularly well-positioned to be the leaders in spearheading transitions at the societal level to sustainability through the integration of community partnerships, research, and teaching with international objectives for sustainability. In spite of such progress, there are still challenges in implementation, particularly in developing nations. Policy fragmentation, resource shortages, lack of teacher training, and infrastructural limitations hinder scaling up holistic greening education reforms (World Wide Fund for Nature, 2023). However, emerging global partnerships, digital creativity, and youth climate activism present promising avenues for bridging these gaps and speeding up transformative reform (United Nations Educational, 2024). Application of Greening Education in developing nations involves distinctive challenges and opportunities formed by socio-economic contexts, policy environments, educational infrastructures, and

cultural milieus. Pakistan represents a developing nation in which environmental vulnerabilities converge with imperatives of educational reform, hence constituting a key case study for learning the everyday dynamics and effects of Greening Education efforts. Pakistan is confronted with a host of environmental problems like water deficiency, air and water contamination, forest depletion, and the negative effects of climate change like enhanced flooding and extreme temperatures. These place sustainable development at risk and require immediate education interventions to establish resilience and stewardship for generations to come (World Wide Fund for Nature, 2023). Notwithstanding the increasing demands, the integration of environmental education into Pakistan's national curriculum has traditionally been restricted and disjointed—tackled through discrete topics rather being incorporated within a cohesive, systematic framework for sustainability education (Abadtak, 2023).

Recent national policies and activities show a progressive transition towards the environmentalization of education. The Pakistan Environmental Protection Agency Act and its related frameworks underscore the significance of promoting environmental awareness and education. The Government of Pakistan's Clean Green Pakistan initiative aims to enhance environmental conditions in metropolitan areas by integrating educational knowledge and community involvement (Government of Pakistan, 2012).

Additionally, various NGOs and international organisations have partnered with schools to implement greening projects, provide teacher training, and advocate for community-based learning initiatives designed to improve environmental literacy and sustainable practices (World Wide Fund for Nature, 2023). (Abadtak, 2023). An exemplary case is WWF Pakistan's Environmental Education Programme, which addresses both official and informal education sectors. It introduces school-based environmental clubs, resource centers, and participatory learning models focusing on local ecological concerns and community involvement. The programs proved to improve students' environmental literacy and positive attitudinal changes and present a replicable model for curriculum integration at large (World Wide Fund for Nature, 2023).

At the higher education level, several Pakistani universities have signed on to the Talloires Declaration and started sustainability offices to organize greening initiatives. These include revising the curriculum to include sustainability themes, campus greening initiatives, and research projects on local environmental issues. Such actions are, however, uneven and limited by budgetary constraints, inadequate faculty knowledge, and conflicting academic demands (Malik, 2004).

One of the greatest challenges is the absence of coordinated policy implementation and resource distribution to mainstream Greening Education holistically throughout Pakistan's multilayered and heterogeneous education system. Structural impediments remain in rural and disadvantaged regions where infrastructural shortcomings hinder efficient program implementation. However, increased awareness of ecological crises among youth and civil society puts pressure on the extension of greening education activities (UKFIET, 2024).

Overall, the Pakistan case study emphasizes the urgent need for combined policy systems, institutional capacity, inclusive curricula, and community collaboration to scale Greening Education on a large scale Pakistani teachings focus on context-specific approaches recognizing local environmental realities and socio-economic constraints and referencing universal platforms for sustainability.

6.1. Implications

6.1.1. Theoretical Implications

The Greening Education framework in this research powerfully adds to the current discourse on Education for Sustainable Development by presenting an integrated model that combines systems thinking, lifecycle views, and student agency with larger elements such as environmental literacy, ethical decision-making, and the cultivation of a quality-driven school culture. It is an interdisciplinary approach that challenges reductionist thinking that sees sustainability education as a particular discipline, but instead, it is a generalized educational model that ought to be integrated in a holistic way across disciplines, developmental levels, and levels of institutions (United Nations Educational, 2024; Voulvoulis et al., 2022).

It also puts forward the need to add ethical thought and environmental awareness to formal education systems, as research in the socio-ecological system and transformatory pedagogy (Persico, Manca, & Pozzi, 2012; Trevisan, Leal Filho, & Pedrozo, 2024) suggests. In addition, the framework also offers context-sensitive approach particularly to be applied to developing countries to enable to factor in such factors as resources availability, cultural values and policy contexts that tend to be neglected and thereby offers global theoretical clarity to localisation of sustainability education (Malik, 2004; Abadtak, 2023).

6.1.2. Practical Implications

This framework offers viable suggestions to policy makers, learning institutions and practitioners who want to make education towards sustainability an integral part of education systems. On the policy level, it requires the adoption of uniform and enforceable legislations to compel and empower agendas of greening educational systems especially in the low-resourced developing nations (Sharma, 2025; World Wide Fund for Nature, 2023). In the case of learning institutions, it highlights the importance of institutional leadership in accelerating a culture of quality with sustainability as the main priority with the help of curriculum reform, faculty development, and campus practices based on ecological principles (Rebelatto et al., 2019). The suggested strategy facilitates integration of systems thinking and environmental consciousness across different fields of studies instead of limiting sustainability to one or two courses, thus improving the learner engagement and agency (Gkargkavouzi & Halkos, 2025).

It emphasizes the need to inculcate integrity in decision-making to equip the students to tackle ethical complexity of the sustainability issues, as well as to operate as responsible professionals and engaged citizens (Trevisan, Leal Filho, & Pedrozo, 2024). Some of the suggested implementation strategies include experiential and community-based learning, incorporation of indigenous knowledge, and creation of cross-sectoral partnerships involving families, local communities, governmental organizations and business organisations that can create synergistic impacts (United Nations Educational, 2024). The Participatory techniques can enhance applicability, ownership and sustainability in sustainability education programs. The framework identifies the necessity to create contextualised, inclusive, and lifelong learning pathways that would enhance resilience and flexibility in quickly transforming environmental and socio-economic contexts. It also aligns with the international education priorities identified by the international frameworks, such as the Sustainable Development Goals of the United Nations and the Greening Education Partnership that demand transformative learning as the tool of enabling learners to take positive action and move towards sustainable future (United Nations Educational, 2024).

7. Conclusion, Limitations, and Future Research Directions

Greening Education should be integrated into the education systems of the world to meet the multiple and compound environmental issues of the 21st century. This study provides the focus that Greening Education, a system thinking, life cycle thinking, learner agency, and broader considerations such as environmental literacy, ethical decision-making and active citizenship development among learners offers a solid approach to developing sustainability literacy, ethical sensitization and active citizenship among learners. In less developed countries such as Pakistan where ecological vulnerabilities interact with the limits of development, the harmonious educational plan is required to increase the socio-ecological resilience and fair development.

The assessment reveals that despite the promising progress in both international and domestic programs, significant institutional hurdles—i.e., inadequate resources, policy inconsistencies, and infrastructural inadequacies—remains in the way of large-scale implementation. Facing these challenges requires collaborative policy strategies, persistent institutional commitment, professional skill development, and culturally sensitive curriculum that equip students to understand and interact with sustainability issues. When reframed through the Greening Education lens, education can serve as a change-driving force, empowering generations to meet environmental challenges with flexibility, diversity, and creativity. This study presents a theoretically informed, context-aware approach to assist educators, policymakers, and practitioners in integrating sustainability into the core of education. This research is limited by its dependence on secondary data and theoretical

frameworks, lacking primary empirical validation. The lack of field research, stakeholder discussions, and longitudinal case analyses hinders the evaluation of the framework's practical efficacy, contextual adaptation, and scalability across various educational and cultural contexts. The quickly evolving and complex character of sustainability education, influenced by shifting socio-political, technological, and environmental dynamics, complicates the thorough capture of all relevant aspects within a single study. In addition, the emphasis on Pakistan as a primary case study—despite offering important localized findings—risks constraining generalizability to other developing nations with variant political, economic, and environmental realities. Lastly, the broader system concerns of global economic inequalities and geopolitical tensions, which also affect education and sustainability outcomes, are outside the scope of this research but warrant exploration in future research.

Based on this foundational research, subsequent research should focus on empirical studies to test and calibrate the proposed Greening Education framework through case studies, pilot interventions, and program evaluations across a range of geographical and institutional settings. Mixed-methods research integrating qualitative and quantitative information would clarify the multifaceted impacts of greening education programs on learner achievements, institutional practice, and community participation. Comparative cross-national research can further decompose contextual determinants of effective incorporation of sustainability learning, particularly in low- and middle-income nations. Studies investigating the influence of technological innovations, including digital learning platforms and virtual reality, in boosting greening learning are also recommended, considering their scalability and accessibility potential.

In addition, research into teacher training models, capacity-building frameworks, and policy implementation strategies can lead to effective recommendations for addressing current systemic constraints. Engaging collaboration among many stakeholders—such as students, educators, policymakers, and local communities—via participatory methods can improve comprehension of diverse educational requirements and facilitate the co-development of pertinent material and delivery methods. Ultimately, performing longitudinal follow-up studies to monitor the enduring effects of greening education on students' attitudes, behaviours, and career paths would produce significant evidence to inform ongoing enhancement and investment in global sustainability education.

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