

 Research Article

Making Green Schools a Reality through Economically Sustainable Strategies

Meenal Arora¹ 

¹Department of Education, Mata Sundri College for Women, University of Delhi, Delhi, India

Abstract

The imperative to “learn to live sustainably” is widely recognized, yet environmental concerns remain marginal within mainstream educational systems across the globe. Education, as identified by UNESCO, is both a foundational pillar of sustainable development and its principal enabler, capable of shaping attitudes and competencies necessary for effective climate action and resource management (UNESCO, 2024). Green Schools exemplify this integration by employing a whole-institution approach to embed sustainability within teaching, operations, governance, and community engagement, empowering learners and all school stakeholders to address complex social, economic, and environmental challenges. This study aims to guide policymakers, school administrators, and education managers in adopting economically sustainable strategies for the realization of Green Schools. The research employed a qualitative methodology, combining systematic literature review of academic publications, policy reports, and institutional case studies discussing the environmental, social, and economic dimensions of sustainable schooling. To enhance contextual relevance, the study also incorporated case studies of schools in India that have successfully implemented green initiatives, using semi-structured interviews and surveys with administrators, teachers, and students to capture firsthand experiences and perceptions. Key findings indicate that the sustainable transformation of schools is facilitated by four core strategies: developing multi-sector partnerships, reinvesting operational cost savings, leveraging strengths-based models to integrate sustainability across disciplines, and employing cost-effective technologies that reduce environmental footprints while fostering financial resilience. Notably, case examples illustrate how these strategies—when adopted collectively—embed environmental responsibility throughout school governance, operations, curriculum, and community relationships. The study concludes that actionable, economically sustainable models empower all members of the school community, from leadership to learners, to participate actively in advancing Education for Sustainable Development (ESD) goals. By presenting replicable best practices and mechanisms for continuous improvement, this research contributes practical insights for schools worldwide seeking to align their educational environments with global sustainability objectives.

Keywords: Economic Sustainability, Education for Sustainable Development, Green Schools

 Correspondence

Meenal Arora

meenalarora@ms.du.ac.in

Received

July 24, 2025

Accepted

November 9, 2025

Published

December 1, 2025

Citation: Arora, M. (2025).

Making green schools a reality through economically sustainable strategies. *Journal of Education for Sustainable Development Studies*, 2(2), 146–155.

DOI: [10.70232/jesds.v2i2.51](https://doi.org/10.70232/jesds.v2i2.51)

© 2025 The Author(s).

Published by

Scientia Publica Media



This is an open access article distributed under the terms of the Creative Commons Attribution-NonCommercial License.

1. INTRODUCTION

Modern education systems are required to align with the objectives of the 2030 Agenda for Sustainable Development, equipping young people to effectively confront the pressing issues of climate change, biodiversity decline, and the depletion of natural resources, all of which pose serious risks to health and well-being. The concept of Green Schools centers on fostering a sustainable culture that enables students to “make informed choices and take responsible actions for environmental integrity, economic sustainability, and social justice in present and future societies, with respect for cultural diversity”

(UNESCO, 2014, p. 12; UNESCO, 2016a, p. 9). The Green School approach emphasizes education for sustainable development (ESD), aiming for a holistic and transformative process that encompasses learning content, pedagogy, educational environment, and outcomes.

ESD is designed to bring 21st-century themes—such as waste reduction, water stewardship, biodiversity protection, energy efficiency, and conservation—into the curriculum, while also fostering democratic, participatory, and student-centered learning experiences. High-quality education within this framework actively engages students cognitively, emotionally, and physically, facilitating the development of competencies that are essential for advancing sustainability (Mason, Mastromatteo, Rocchi, & Scrimin, 2025). In this context, the present research paper proposes four practical strategies that schools can utilize to economically support their transition into Green Schools.

1.1. Literature Review

In 2006, UNESCO drew attention to the considerable financial barriers involved in retraining teachers worldwide to address themes of sustainability (UNESCO, 2006). Rather than relying on remedial strategies, UNESCO recommended innovative methods in both pre-service and in-service teacher education, recognizing that every educator and subject area has the potential to make meaningful contributions to sustainability education using a strengths-based model. While significant progress was made in documenting the environmental dimension of Education for Sustainable Development (ESD), it was noted that the social and economic aspects still required greater emphasis (Tilbury, 2011). Schools featuring initiatives such as multicultural education, anti-racism programs, gender equity, anti-bullying campaigns, and peace education were shown to play key roles in promoting the social aspect of ESD (Hopkins & McKeown, 2005).

By 2012, UNESCO reinforced its support for the strengths-based approach, urging policymakers to recognize the diverse roles that all members of the school community—including teachers, managers, and administrators—could play in advancing ESD (UNESCO, 2012). This model minimizes the need for extra staff or resources, as many components of sustainable development are already integrated within existing curricula. Pedagogical tools were drawn from a variety of disciplines: scientific inquiry, spatial analysis from geography, communication and writing from language arts, artistic creativity, and advanced thinking skills from multiple subject areas (Sterling, 2001). Effective implementation was achieved by identifying opportunities within mandatory curricula to introduce examples, concepts, perspectives, values, or skills pertinent to sustainability.

By 2015, the dialogue shifted further toward policy and practice, with Lane, Harris, and Mense emphasizing that school leaders need a clear understanding of the links between culture, policy frameworks, and funding in order to secure resources for constructing new buildings or making existing ones sustainable (Lane et al., 2015). Their work highlighted the value of developing policies that prioritize green school design and sourcing financial support from federal, state, and local agencies. Such efforts were shown to benefit not only the school but also the community, yielding reduced energy consumption, better health outcomes, and improved academic achievement. Building a culture that appreciates sustainable practices and articulating a clear environmental vision were found to be essential for gaining support for green initiatives.

During this time, Lemoine et al. (2015) addressed the challenges that arise when schools face shrinking financial resources and higher academic demands. They challenged the notion that sustainable schools entail greater costs than traditional models, pointing out that energy expenses—second only to staff salaries—offered opportunities for investment returns via sustainability measures in new builds or retrofits. By adopting business-focused tools, such as Return on Investment (ROI) analysis, they demonstrated that well-managed green schools can achieve substantial financial benefits.

McCormack et al. compared the costs of conventional versus green school construction and energy sources, providing actionable insights for school leaders, administrators, and policymakers facing future construction decisions (McCormack et al., 2015). Drawing on evidence from schools across the United States, their analysis concluded that green institutions can be realized at equal or even lower costs compared to conventional buildings, with major advantages derived from prioritizing occupant health and energy efficiency.

The Green Movement has become a defining element of 21st-century sustainability efforts, influencing research agendas, university practices, and policies at national and global levels. Waller (2015) investigated this progression, tracing its beginnings back to the Kyoto Protocol in 1972, when international delegates endeavored to protect Earth for future generations. By examining university research and industry programs, Waller illuminated how principles of sustainability and green building are being adopted in public education, providing ROI metrics from both corporate and educational perspectives.

More recently, there has been a marked shift toward sustainable school design, with architectural innovations such as solar panels, rainwater harvesting systems, and enhanced natural lighting features aimed at reducing environmental impacts and enriching educational experiences (ArchDaily, 2024). Schools like the Nueva School and the School of Visual Arts of Oaxaca have led the way by employing local materials to further limit emissions, embodying a dedication to future generations and motivating students to address ecological concerns (Architectural Digest, 2024). The achievements of schools in Poland, Italy, India, and Argentina, recognized for their outstanding community and environmental contributions, further illustrate the growing global focus on integrating sustainability into educational practice (Reuters, 2024).

Overall, this chronological account highlights the deepening sophistication in approaches to sustainability in education, revealing the broad array of practices and widespread benefits generated by embedding sustainable development principles within educational systems.

1.2. Research Gaps and Need for the Study

While existing literature extensively discusses the environmental, social, and economic benefits of Green Schools, a critical gap remains in identifying economically viable strategies for their large-scale implementation, particularly in resource-constrained settings. Studies have primarily focused on the return on investment (ROI) of Green Schools in developed economies (Lemoine et al., 2015; McCormack et al., 2015), the role of policy and funding mechanisms (Lane et al., 2015), and the integration of sustainability within the existing education curriculum (UNESCO, 2012). However, there is limited research on cost-effective, scalable approaches that enable educational institutions—especially in developing countries—to transition towards sustainable school infrastructure without significant financial burdens. Moreover, while some studies explore funding sources, there is a lack of comprehensive frameworks synthesising government policies, private sector investment, and community-driven initiatives to make Green Schools both accessible and sustainable in the long term. This study seeks to bridge this gap by examining economically viable ways to make Green Schools a reality, identifying low-cost sustainable practices, innovative financing models, and strategic policy recommendations that ensure Green Schools are not just an ideal but a feasible and scalable reality for education systems worldwide.

2. METHODS

2.1. Research Design

This study employed a qualitative research design to explore economically viable strategies for implementing green school initiatives. A multi-method approach was adopted, incorporating a systematic literature review, case study analysis, qualitative data collection, thematic analysis, and comparative cost analysis. This methodology allowed for a holistic understanding of sustainable school practices by integrating theoretical perspectives with empirical evidence (Creswell & Poth, 2018).

The research process followed these key steps:

2.1.1. Literature Review

A systematic literature review was conducted to identify existing strategies and frameworks for sustainable education. The review encompassed academic studies, policy reports, and institutional case studies that discuss green schools' environmental, social, and economic dimensions (Sterling, 2001; UNESCO, 2012). Key sources included UNESCO reports, peer-reviewed journal articles, and case studies from organisations like the Centre for Science and Environment (CSE) and the Global Schools Program. The literature review provided a conceptual foundation for cost-effective sustainability approaches and identified gaps in existing research on the financial viability of green schools (Tilbury, 2011).

2.1.2. Cost Study Analysis

A case study approach was employed to examine schools in India that have successfully implemented green initiatives. This method effectively captures real-world applications of sustainability practices and derives actionable insights (Yin, 2018). The study analysed documented case studies sourced from publications like *Paving the Path: A Selection of Best Environmental Practices in Schools Across India* (CSE, 2019). Each case study was examined for key strategies such as:

- i. Developing partnerships with local businesses and NGOs
- ii. Reinvesting operational savings into sustainability projects
- iii. Leveraging the strengths model to integrate sustainability within the curriculum
- iv. Adopting cost-efficient green technologies such as solar energy, rainwater harvesting, and biomass cooking systems

2.1.3. Data Collection

A combination of semi-structured interviews and surveys was conducted to gather qualitative data from school administrators, teachers, and students directly involved in implementing green initiatives (Merriam & Tisdell, 2015). The study focused on schools that have adopted low-cost sustainable practices, such as:

- i. Birla Balika Vidyapeeth, which installed solar energy systems to reduce electricity costs
- ii. New Digamber Public School, which transitioned to biomass pellets for cooking as an alternative to LPG
- iii. Rishi Valley School, known for its rainwater harvesting and sustainable agriculture projects

From each of the schools mentioned above, one school administrator or head was interviewed using a semi-structured interview schedule, two teachers involved in the initiative filled out an open-ended descriptive questionnaire, and 10 middle school students were included in the focus group discussion. These instruments were developed by the author for the purpose of the study and validated by three experts in the field. These cases provided empirical data on economic and environmental outcomes, highlighting how sustainability practices can be financially viable for educational institutions.

2.1.4. Thematic Analysis

The collected qualitative data were analysed using thematic analysis, a widely used method for identifying patterns and recurring themes within qualitative research (Braun & Clarke, 2006). A six-step coding process was employed to categorise data into four primary themes:

- i. Developing partnerships with funding agencies and community stakeholders
- ii. Reinvesting operational savings from reduced energy and resource costs
- iii. Leveraging the strengths model to integrate sustainability within existing curricula
- iv. Adopting cost-efficient technologies such as LED lighting, solar panels, and rainwater harvesting

These themes formed the basis for the recommendations presented in the study.

This multi-method approach enabled a comprehensive understanding of how schools can cost-effectively integrate sustainability into their operations. The combination of literature review, case studies, field data, and financial analysis ensured that the study was both theoretically rigorous and practically relevant. By addressing the gap in research on economically viable strategies for Green Schools, this study contributes to the growing body of knowledge on sustainable education. It offers actionable insights for policymakers, educators, and school administrators.

3. RESULTS

In order to enhance the capacity of the school to take up environmental initiatives, the following ways have been identified to make green schools economically viable:

3.1. Developing Partnerships

Establishing partnerships with organisations at the central, state, and local levels emerges as a critical strategy for achieving economic viability in the design and operation of green schools. Schools, being microcosms of their communities, inherently reflect the values and priorities of their surrounding environments. As sustainability gains prominence globally, various governmental and non-governmental organisations have launched initiatives to promote eco-friendly practices within schools. Examples include Green Good Deeds, the Green School Award, Paryavaran Mitra Puraskara, and Earthian, led by the Ministry of Environment, Forest and Climate Change, the Centre for Science and Environment, the Centre for Environment Education, and Wipro, respectively. These programs not only recognise schools for their sustainability efforts but also encourage the adoption of eco-friendly practices by influencing public opinion.

Funding opportunities for such initiatives are available through government schemes such as Atal Tinkering Labs (NITI Aayog) and the Rashtriya Avishkaar Yojana (Ministry of Human Resource Development). Similarly, corporate social responsibility (CSR) initiatives, such as Wipro's Seeding Program and WWF's support for vermicomposting pits, further facilitate resource mobilisation. Schools can also leverage internal funding sources, including donations from parents and teachers, community fundraisers, and sponsorships. Hosting events such as auctions or plant sales can generate additional revenue for targeted projects. These funding streams, whether external or internal, enhance a school's ability to implement and sustain green initiatives effectively.

Example: Harnessing Solar Energy Through Partnerships

A compelling example of successful partnerships in promoting sustainability is seen in Birla Balika Vidyapeeth, a residential school for girls in Pilani, Rajasthan. Supported by the Birla Education Trust (BET), the school collaborated with Sun Waves Infrapower, a Jaipur-based agency, to install rooftop solar panels on its campus. The installation, provided at no cost to the school, came with the agreement that the school would pay Rs 4.40 per unit of electricity generated by the panels over 25 years. The total area covered by the solar panels spans approximately 6,300 square meters, producing an average of over 40,000 kWh of electricity per month.

This arrangement proved to be highly cost-effective. The Rajasthan State Electricity Board (RSEB) charged the school between Rs 11.33 and Rs 12 per unit of electricity. In contrast, the solar panel agency charged Rs 4.40 per unit, resulting in a savings of Rs 6.93 per unit consumed. With an average monthly output of 40,000 kWh, the school saved approximately Rs 2,77,200 per month.

This case study underscores the financial and environmental benefits of integrating renewable energy solutions into educational institutions. The initiative also highlights how strategic partnerships can enable schools to achieve significant cost reductions while contributing to sustainable practices. These details are documented in *Paving the Path: A Selection of Best Environmental Practices in Schools Across India*, published by the Centre for Science and Environment in Delhi.

3.2. Reinvesting Operational Savings into Additional Projects or Green Initiatives

Reinvesting operational savings into environmentally focused projects or initiatives represents a proactive and sustainable strategy for schools aiming to enhance their green initiatives. This approach allows schools to maximise the financial benefits of cost-cutting measures while fostering long-term sustainability. Several practical methods have been identified for effectively utilising these savings:

- i. Collaborating with Local Building Developers
Schools can establish partnerships with local building developers to obtain scrap materials that can be repurposed for creating garden beds or other eco-friendly projects. This strategy minimises waste and provides a cost-effective solution for enhancing the school's green infrastructure.

- i. **Fundraising Through Plant Sales**
Organising plant sales during occasions like Mother's Day offers a creative way to generate funds for green initiatives. Schools can grow plants in their own gardens or collaborate with local nurseries to offer a variety of plants to the community, combining financial benefits with community engagement.
- ii. **Developing and Selling Kids' Special Cookbooks**
Creating a cookbook featuring healthy, locally sourced recipes serves as both a fundraising and educational initiative. By promoting the use of locally grown ingredients, this project raises awareness about sustainable cooking practices among children and their families while contributing to green project funding.
- v. **Producing and Selling Calendars with Nature Photography**
Designing calendars that feature captivating images of plants and flowers from the school's environment provides another fundraising opportunity. These calendars can be marketed during events or to the broader community, celebrating nature's beauty while supporting the school's green efforts.
- vi. **Seeking In-Kind Donations**
Schools can request in-kind donations from local businesses or community members, such as plants, seeds, gardening tools, or other resources necessary for their green projects. This collaborative approach not only reduces costs but also fosters greater community involvement in sustainability initiatives.

By reinvesting savings and exploring creative funding opportunities, schools can build a robust framework to sustain and expand their environmental projects while cultivating a culture of ecological responsibility.

3.3. Adopting the Strengths Model

UNESCO (2006) emphasises that the financial and logistical challenges of reorienting education systems to address sustainability are so substantial that relying solely on a remediation model to retrain in-service teachers is neither feasible nor sustainable. Instead, UNESCO advocates for designing innovative approaches to pre-service and in-service teacher education. One such approach is adopting the strengths model (UNESCO, 2012), which leverages the existing capabilities of every school community member—be it teachers, managers, or administrators—to contribute to Education for Sustainable Development (ESD). This model eliminates the need to hire additional personnel or invest in extensive retraining programs, as it integrates sustainability education within the existing disciplines and curricula.

By utilising the strengths model, educators from all disciplines can seamlessly incorporate ESD-related knowledge, values, and skills into their teaching. For instance:

- i. **Mathematics Teachers**
Mathematics educators can raise awareness of societal inequalities by incorporating examples into lessons on percentages, normal distribution, or algebraic expressions. These applications provide opportunities to explore themes of equity and fairness within a mathematical framework.
- ii. **Science Teachers**
Science instruction naturally lends itself to discussions on sustainability. Teachers can educate students about critical topics such as food waste, water scarcity, pollution, and resource conservation, emphasising the importance of judicious use of natural resources and effective waste management practices.
- iii. **Social Studies Teachers**
Social studies classes can engage students in understanding their societal roles and the forces that shape their lives. This subject provides fertile ground for critical discussions on discrimination, gender inequality, stereotypes, injustice, diversity, democracy, and other issues central to a just and sustainable society.
- iv. **Language and Arts Teachers**
Language and arts educators can help students reflect on issues such as climate change, consumerism, and the exploitation of natural resources. By encouraging students to become critical readers, writers, actors, and performers, these disciplines cultivate a deeper understanding of and engagement with sustainability challenges.

The strengths model thus offers a practical, cost-effective pathway for integrating sustainability into educational practices, utilising the collective expertise of the school community to foster a culture of environmental awareness and responsibility.

3.4. Shifting to Economically Viable Technologies

Adopting economically viable technologies is a crucial strategy for schools seeking to balance cost efficiency with environmental responsibility. McCormack et al. (2015) conducted a cost analysis of green school initiatives, demonstrating that schools can be constructed at or below the cost of conventionally designed schools while offering significant advantages. They assert that “amazing things happen when schools are designed, constructed, and operated with a focus on occupant health and energy efficiency”.

One illustrative example of economically viable technology adoption is the shift from liquefied petroleum gas (LPG) to biomass pellets for cooking fuel. This approach is both environmentally friendly and cost-effective, as demonstrated in the case of New Digamber Public School, Indore, Madhya Pradesh.

Case Study: Cost Comparison of Biomass Pellets and LPG

Before the shift, the school consumed approximately 155 to 160 commercial LPG cylinders per month, each containing 19 kg of gas and costing Rs 1,450. This amounted to a monthly expenditure of Rs 2,24,750 to Rs 2,32,000. By partially transitioning to biomass pellets, the school reduced its LPG consumption to 105–110 cylinders per month, achieving a reduction of 50 cylinders. This shift resulted in monthly savings of Rs 72,500, calculated as Rs 1,450 per cylinder for the 50 cylinders saved.

The school’s daily consumption of biomass pellets was approximately 90 kg, with each kilogram costing Rs 18. Over an average of 25 working days per month, the total monthly cost of biomass pellets was Rs 40,500. Factoring in the savings from reduced LPG usage, the net monthly savings amounted to Rs 32,000. Over the course of a 10-month academic year, this translated into total annual savings of Rs 3,20,000.

In terms of energy equivalence, 2.5 kg of biomass pellets provide the same energy as 1 kg of LPG. The cost of 2.5 kg of biomass pellets is Rs 45, compared to Rs 76.50 for 1 kg of LPG, further underscoring the economic advantage of biomass pellets.

This initiative demonstrates the dual benefits of adopting biomass pellets as a cooking fuel. Not only does this practice reduce operational costs, but it also minimizes environmental impact by shifting to a renewable and sustainable energy source. This case study is documented in *Paving the Path: A Selection of Best Environmental Practices in Schools Across India*, published by the Centre for Science and Environment in Delhi.

4. DISCUSSION

The findings of this study underscore the feasibility of adopting economically viable strategies to transform schools into sustainable learning environments. By focusing on partnerships, reinvesting operational savings, leveraging the strengths model, and utilising cost-efficient technologies, schools can address environmental challenges while managing financial constraints. This study reaffirms previous research suggesting that sustainable schools can be both environmentally responsible and financially feasible (Sterling, 2001).

Developing partnerships emerged as a critical enabler of sustainability. The case of Birla Balika Vidyapeeth’s collaboration with a renewable energy provider to install solar panels highlights how strategic alliances can reduce costs while promoting environmental responsibility. Schools can also leverage community support, corporate social responsibility (CSR) initiatives, and governmental programs to access funding and resources. Contemporary research demonstrates how schools partnering with renewable energy providers and leveraging community support create the strongest foundations for scalable green projects. Innovative financing models—including public-private partnerships and energy cooperatives—have reduced initial financial barriers for green infrastructure, particularly in under-resourced communities

(Journal of Environment, Natural Resources Research, 2025). These multi-sector collaborations foster a culture of responsibility while unlocking funding avenues that traditional school budgets cannot provide. Policymakers should strengthen incentive programs and grants to facilitate such collaborations, making green initiatives more accessible to schools in diverse economic settings.

The reinvestment of operational savings into further sustainability projects has been validated as a transformative strategy for schools. A recent empirical study highlights how financial gains from energy retrofits and other resource-saving practices are most effective when deployed cyclically into new and ongoing green initiatives (ASCE Library, 2022). Such self-sustaining mechanisms ensure continuity of environmental projects and promote stewardship among students and community members. Initiatives such as organising plant sales or publishing cookbooks reinforce the importance of engaging students, parents, and the community in creative, low-cost fundraising activities. Beyond financial benefits, these efforts cultivate a culture of environmental stewardship, where sustainability is embedded in daily school practices. Future policies could formalise reinvestment models within school financial planning to ensure the long-term sustainability of green projects.

The Strengths Model highlights the untapped potential of integrating sustainability across disciplines without requiring additional training or resources. Recent pedagogical research champions the integration of sustainability themes across disciplines rather than limiting them to environmental science courses. Innovative approaches—such as embedding green thinking into mathematics, arts, and social studies—have shown increased student engagement and broader impact. International case studies further highlight that these strengths-based, cross-curricular models offer cost savings and improve learning outcomes while requiring minimal additional resources (“Integrating Green Thinking Through NEP 2020 For Future Employability,” 2025). As discussed, educators can weave sustainability topics into existing curricula across subjects like mathematics, science, social studies, and the arts (UNESCO, 2012). This approach aligns with Education for Sustainable Development (ESD) frameworks, emphasising that every discipline can contribute meaningfully to environmental awareness and action (Tilbury, 2011). Teacher education programs should incorporate sustainability-focused pedagogies, ensuring educators are well-equipped to integrate these concepts into their teaching.

The adoption of economically viable technologies—such as the transition from LPG to biomass pellets for cooking—illustrates the dual benefits of cost savings and environmental impact. The case of New Digamber Public School demonstrates the substantial financial advantages of such shifts, with annual savings of over Rs 3,20,000. Schools implementing renewable energy systems and eco-efficient infrastructure experience measurable reductions in operational costs as well as environmental advantages. Advanced benchmarking frameworks quantify the dual impact of economic and environmental gains, revealing that transitions to green technologies—such as switching from LPG to biomass or adopting solar solutions—yield significant savings and sustainability performance (Kochanski, 2024). Tailored retrofitting strategies optimize outcomes for different school building types and local contexts (“A Model for Developing Retrofitting Strategies for Office Buildings,” 2021). This finding supports previous studies highlighting the financial viability of sustainable infrastructure in educational settings (McCormack et al., 2015). Schools should be encouraged to explore renewable energy options, energy-efficient designs, and waste management technologies supported by government incentives and private-sector collaborations.

These strategies collectively demonstrate that economic constraints need not impede environmental initiatives. Instead, resourcefulness, strategic planning, and stakeholder engagement can enable schools to serve as exemplars of sustainable practices.

5. CONCLUSION

This study demonstrates that implementing economically sustainable strategies can effectively transform schools into green and resilient learning environments (UNESCO, 2019). Key approaches identified include the strengths model for integrating sustainability across all disciplines and leadership roles (UNESCO, 2019), diversified funding sources encompassing governmental and private sector support, and evidence-based cost analyses showing that green schools can match or undercut the building costs of conventional schools while delivering substantial health and efficiency benefits (Verhelst et al., 2021).

Despite these promising outcomes, several noteworthy limitations are acknowledged. Large-scale adoption is influenced by resistance to change, variability in funding awareness, significant initial investment requirements, and the necessity for capacity building among educators and administrators. Moreover, many findings rely primarily on case studies and self-reported data, potentially limiting generalizability across different economic and cultural contexts (Verhelst et al., 2021). The framework for “ESD-effective” school organizations thus warrants further empirical testing and standardized assessment.

Directions for future research include systematic comparisons of sustainability models between developed and developing contexts, exploring innovative, scalable policy solutions such as green bonds, carbon credits, and community-driven finance. There is also a need for longitudinal studies that assess the sustained financial, environmental, and educational benefits of green initiatives over time (UNESCO, 2019). Participatory models that engage students, parents, and wider communities should be evaluated for their role in deepening ESD outcomes and building long-term stewardship (Verhelst et al., 2021).

By focusing on actionable policies, adaptive leadership, and inclusive financial models, schools worldwide can position themselves as drivers of sustainability, fully empowering future generations for responsible citizenship and the advancement of a sustainable planet (UNESCO, 2019; Verhelst et al., 2021).

Acknowledgment. The author acknowledges the contributions of all school administrators, teachers, and students who participated in the study and shared their experiences with green initiatives.

Research Ethics. All procedures were conducted in accordance with applicable laws and institutional regulations, with approval from the relevant institutional committee(s).

Data Availability Statement. Data supporting the findings of this study are available from the corresponding author upon reasonable request.

Conflicts of Interest. The author declares no conflicts of interest.

Funding. No specific funding was received for this research.

REFERENCES

- ArchDaily. (2024). *A Sustainable School Brazil*. ArchDaily. https://www.archdaily.com/1030817/a-sustainable-school-brazil-sem-muros-arquitetura-integrada?ad_source=search&ad_medium=projects_tab
- Architectural Digest. (2024). *The need for sustainable school architecture is more important than ever*. Architectural Digest. <https://www.architecturaldigest.com/story/the-need-for-sustainable-school-architecture-is-more-important-than-ever>
- Bongirwar, R., & Das, B.K. (2025). Integrating Green Thinking Through NEP 2020 For Future Employability. *International Journal of Environmental Sciences*, 11(15s), 2100-2108. <https://theaspd.com/index.php/ijes/article/view/3338>
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Centre for Science and Environment. (2019). *Paving the path: A selection of best environmental practices in schools across India*. Centre for Science and Environment. <https://www.cseindia.org/paving-the-path-9264>
- Creswell, J. W., & Poth, C. N. (2018). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). Sage Publications.
- Ekpei, M., & Agbeve, V. (2025). Advancing U.S. Sustainable Energy: Innovative Financing Models for Renewable Projects. *Journal of Energy Research and Reviews*, 17(5), 31-41. <https://doi.org/10.9734/jenrr/2025/v17i5411>
- Hopkins, C., & McKeown, R. (2005). Education for sustainable development: Past experience, present action, and future prospects. *Educational Philosophy and Theory*, 33(2), 231–244. <https://doi.org/10.1111/j.1469-5812.2001.tb00265.x>
- Ierapetritis, D. G. (2017). Entrepreneurship education at school: A case study on secondary education in Greece. *World Review of Entrepreneurship, Management and Sustainable Development*, 13(2/3), 271–289. <https://ideas.repec.org/a/ids/wremsd/v13y2017i2-3p271-289.html>

- Kochanski, M., Lotz, M. T., & Korczak, K. (2024). Benchmarking circular economy measures in buildings along the 11R framework: A systematic review of quantified impacts on material use, energy consumption, GHG emissions, and costs. *Journal of Cleaner Production*, 485(144337). <https://doi.org/10.1016/j.jclepro.2024.144337>
- Lane, K. E., Harris, S., & Mense, E. G. (2015). Green school financing: Sustainability in a time of economic challenge. In T. C. Chan, E. G. Mense, K. E. Lane, & M. D. Richardson (Eds.), *Marketing the green school: Form, function, and the future* (pp. 282–290). IGI Global. <https://doi.org/10.4018/978-1-4666-6312-1.ch021>
- Lemoine, P. A., Woodard, H. C., & Richardson, M. D. (2015). Return on investment: Are green schools worth the cost? In T. C. Chan, E. G. Mense, K. E. Lane, & M. D. Richardson (Eds.), *Marketing the green school: Form, function, and the future* (pp. 302–308). IGI Global. <https://doi.org/10.4018/978-1-4666-6312-1.ch023>
- Mason, L., Mastromatteo, L. Y., Rocchi, C., & Scrimin, S. (2025). Examining the learning benefits of school lessons in green spaces. *International Journal of Educational Research*, 134, 102770. <https://doi.org/10.1016/j.ijer.2025.102770>
- McCormack, T. J., Lemoine, P., & Greer, D. (2015). Cost analysis of green school initiatives. In T. C. Chan, E. G. Mense, K. E. Lane, & M. D. Richardson (Eds.), *Marketing the green school: Form, function, and the future* (pp. 291–301). IGI Global. <https://doi.org/10.4018/978-1-4666-6312-1.ch022>
- Medal, L., & Kim, A. (2022). Context-Driven Factors for Implementing Energy Efficiency Retrofit in Existing Buildings. *Construction Research Congress 2020: Infrastructure Systems and Sustainability*. <https://ascelibrary.org/doi/10.1061/9780784482858.054>
- Merriam, S. B., & Tisdell, E. J. (2015). *Qualitative research: A guide to design and implementation* (4th ed.). John Wiley & Sons.
- Misra Bakhru, K., & Abidi, N. (2022). Exploring espoused competencies from management teachers for the sustainability of Indian business schools. *World Review of Entrepreneurship, Management and Sustainable Development*, 18(1/2), 65–87. <https://ideas.repec.org/a/ids/wremsd/v18y2022i1-2p65-87.html>
- Reuters. (2024). *Schools in Poland, Italy, and India get awarded for helping community, environment*. Reuters. <https://www.reuters.com/world/schools-poland-italy-india-get-awards-helping-community-environment-2024-10-24/>
- Sharma, M., & Rani, L. (2020). Environmentally sustainable consumption awareness among children: An empirical study. *World Review of Entrepreneurship, Management and Sustainable Development*, 16(1), 76–91. <https://ideas.repec.org/a/ids/wremsd/v16y2020i1p76-91.html>
- Sterling, S. (2001). *Sustainable Education – Re-visioning learning and change*, Schumacher Briefing no 6. Schumacher Society/Green Books, Dartington. <https://archive.org/details/sustainableeduca0000ster/page/98/mode/2up>
- Tilbury, D. (2011). *Education for sustainable development: an expert review of processes and learning*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000191442>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2006). *Education for sustainable development toolkit: Learning and training tools No. 1*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000152453>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2012). *Exploring sustainable development: A multiple-perspective approach (Learning and training tools, No. 3)*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000215431>
- United Nations Educational, Scientific and Cultural Organization (UNESCO). (2019). *Framework for the implementation of Education for Sustainable Development (ESD) beyond 2019*. UNESCO. <https://unesdoc.unesco.org/ark:/48223/pf0000370215>
- Verhelst, D., Vanhoof, J., & Van Petegem, P. (2021). What characterizes an ESD-effective school organization? *Educational Management Administration & Leadership*, 51(2), 372–388. <https://doi.org/10.1177/1741143220985196>
- Waller, R. (2015). Benefits derived from the green school movement. In T. C. Chan, E. G. Mense, K. E. Lane, & M. D. Richardson (Eds.), *Marketing the green school: Form, function, and the future* (pp. 309–318). IGI Global. <https://doi.org/10.4018/978-1-4666-6312-1.ch022>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). Sage Publications. <https://ebooks.umu.ac.ug/librarian/books-file/Case%20Study%20Research%20and%20Applications.pdf>