

From Classroom to Canopy: Assessing the Impact of Green School Environments on Academic Outcomes in Light of National Education Policy 2020

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Abstract

Green school environments are increasingly being recognized as vital components of quality education and sustainable school development. The National Education Policy (NEP) 2020 emphasizes holistic, experiential, and multidisciplinary learning, encouraging educational institutions to create environments that support both academic achievement and environmental responsibility. In this context, the present study examines the impact of green school environments on students' academic outcomes and overall development. The research explores how eco-friendly and nature-based learning spaces, including school gardens, biodiversity zones, green corridors, outdoor classrooms, herbal gardens, and environmental activity centers, contribute to enhancing students' learning experiences and educational performance.

Drawing upon perspectives from environmental education and sustainable development, the study investigates the influence of green surroundings on students' concentration, motivation, creativity, critical thinking, emotional well-being, and classroom engagement. Environmentally enriched school settings provide opportunities for experiential learning, observation, inquiry, and hands-on activities that connect academic knowledge with real-world environmental issues. Such learning experiences foster deeper understanding, improve retention of knowledge, and encourage active participation among learners.

The findings indicate that students studying in green school environments demonstrate higher levels of academic engagement, improved attendance, enhanced academic achievement, and stronger environmental awareness compared to those in conventional learning settings. Green campuses also promote positive social interactions, physical well-being, and pro-environmental attitudes, supporting the holistic development of learners. Furthermore, these environments align closely with the objectives of NEP 2020 by facilitating interdisciplinary learning, sustainability education, and the development of twenty-first-century competencies.

The study concludes that investing in green educational infrastructure and integrating nature-based learning practices can significantly enhance both educational quality and environmental sustainability. Therefore, policymakers, school administrators, and educators should prioritize the development of green school initiatives as an effective strategy for achieving the transformative goals of NEP 2020 and fostering a generation of environmentally responsible and academically competent citizens.

Keywords: *Green School Environment, Academic Outcomes, National Education Policy 2020, Environmental Education, Sustainable Development, Experiential Learning, School Gardens, Holistic Development, Green Infrastructure, Academic Excellence.*

Introduction

Education plays a fundamental role in shaping individuals and societies, and its effectiveness is influenced not only by curriculum and pedagogy but also by the learning environment in which education takes place. In recent years, increasing attention has been given to the concept of green school environments, which integrate natural elements, environmentally sustainable infrastructure, and nature-based learning opportunities into educational settings. Green

schools are designed to promote environmental stewardship while simultaneously enhancing students' academic, social, emotional, and physical well-being (UNESCO, 2020).

The growing concerns regarding climate change, environmental degradation, biodiversity loss, and unsustainable resource consumption have highlighted the need for educational institutions to play an active role in promoting sustainability. Schools are increasingly recognized as important sites for fostering environmental awareness and responsible citizenship among young learners (Tilbury, 2011). Consequently, green school

initiatives such as school gardens, biodiversity parks, rainwater harvesting systems, herbal gardens, waste management practices, and outdoor learning spaces have gained prominence worldwide as innovative approaches to improving both educational quality and environmental sustainability (Henderson & Tilbury, 2004).

Research suggests that exposure to natural environments positively influences cognitive functioning, attention restoration, creativity, emotional well-being, and academic performance among students (Kuo, Barnes, & Jordan, 2019). Nature-rich school environments provide opportunities for experiential and inquiry-based learning that encourage students to connect theoretical knowledge with real-life environmental contexts. Such learning experiences contribute to deeper understanding, enhanced motivation, improved classroom engagement, and higher academic achievement (Louv, 2008).

In the Indian context, the National Education Policy (NEP) 2020 emphasizes holistic and multidisciplinary education that integrates environmental awareness, sustainability, experiential learning, and critical thinking into the educational process (Government of India, 2020). The policy advocates learner-centered approaches that move beyond rote memorization and encourage meaningful interactions between students and their surroundings. Green school environments offer practical avenues for implementing these principles by transforming school campuses into dynamic learning ecosystems where environmental education becomes an integral part of everyday learning experiences.

Against this backdrop, the present study seeks to assess the impact of green school environments on academic outcomes in light of the objectives and vision of NEP 2020. The study explores how nature-based educational settings contribute to enhancing students' academic performance, environmental awareness, and holistic development while supporting sustainable educational transformation.

Background of the Study

The concept of green schools emerged from the broader movement toward sustainable development and environmental education that gained international recognition following the publication of the Brundtland Report *Our Common Future* (World Commission on

Environment and Development, 1987). Sustainable development emphasized the need to balance economic growth, social equity, and environmental protection, leading educational institutions to reconsider their role in promoting environmentally responsible behavior among future generations.

Over the past two decades, educational researchers and policymakers have increasingly acknowledged that the physical environment of schools significantly influences students' learning experiences and academic outcomes (Earthman, 2004). Studies have shown that well-designed school environments characterized by adequate natural lighting, green spaces, vegetation, and healthy surroundings can positively affect students' concentration, attendance, motivation, and educational achievement (Barrett et al., 2015).

Green school environments extend beyond environmentally friendly infrastructure to encompass pedagogical practices that utilize natural settings as learning resources. School gardens, outdoor classrooms, biodiversity conservation projects, composting initiatives, and environmental clubs provide opportunities for experiential learning that enhance students' understanding of science, geography, environmental studies, mathematics, and social sciences (Blair, 2009). Such initiatives encourage observation, experimentation, problem-solving, and collaboration, thereby supporting holistic educational development.

Globally, organizations such as UNESCO have promoted Education for Sustainable Development (ESD) as a means of integrating sustainability principles into educational systems (UNESCO, 2017). ESD encourages schools to create learning environments that foster environmental literacy, responsible decision-making, and sustainable lifestyles. Green schools are considered practical manifestations of ESD because they integrate environmental sustainability into infrastructure, curriculum, pedagogy, and community engagement.

In India, environmental education has gradually become an important component of school curricula. The National Education Policy 2020 further strengthens this commitment by emphasizing experiential learning, competency-based education, multidisciplinary approaches, and environmental consciousness (Government of India, 2020). The policy recognizes that educational institutions should nurture learners who are capable of addressing complex

environmental and societal challenges. Consequently, green school environments have emerged as valuable educational resources that support the implementation of NEP 2020 while contributing to students' academic excellence and environmental responsibility.

Despite growing interest in green school initiatives, empirical studies examining their impact on academic outcomes within the Indian educational context remain limited. Therefore, investigating the relationship between green school environments and students' academic performance is essential for understanding how sustainable educational practices can contribute to achieving the goals of NEP 2020.

Rationale of the Study

The need for the present study arises from the increasing recognition that educational quality and environmental sustainability are interconnected objectives in contemporary education systems. While considerable efforts have been made to improve curriculum design, teaching methods, and assessment practices, relatively less attention has been given to the role of school environments in influencing students' learning outcomes and overall development (Barrett et al., 2015).

The National Education Policy 2020 advocates a transformative vision of education that emphasizes experiential learning, critical thinking, creativity, environmental awareness, and holistic development (Government of India, 2020). Achieving these objectives requires educational institutions to move beyond traditional classroom-based instruction and create learning environments that support active engagement with real-world contexts. Green school environments provide such opportunities by integrating natural elements and sustainability practices into everyday educational experiences. Several international studies have reported positive associations between exposure to green spaces and improved cognitive functioning, attention restoration, academic performance, and psychological well-being among students (Kuo et al., 2019; Chawla, 2015). Nature-based learning environments encourage curiosity, inquiry, and experiential learning, which are central principles of contemporary educational reforms. Furthermore, green schools contribute to environmental literacy and sustainable behavior, enabling learners to develop the competencies needed to address future environmental challenges (UNESCO, 2020).

In the Indian context, empirical evidence regarding the educational benefits of green school environments remains limited, particularly concerning their alignment with the goals of NEP 2020. Many schools continue to operate in conventional settings where opportunities for environmental engagement and outdoor learning are restricted. Understanding how green campuses influence academic outcomes can provide valuable insights for policymakers, school leaders, and educators seeking effective strategies for educational improvement and sustainability integration.

The study is therefore significant because it examines the potential of green school environments to enhance academic achievement, student engagement, environmental awareness, and holistic development. The findings may contribute to educational planning, school infrastructure development, environmental education initiatives, and policy implementation efforts aimed at realizing the vision of NEP 2020. Moreover, the study can serve as a reference for promoting sustainable school transformation and fostering environmentally responsible future citizens.

Corresponding Objective–Research Question Matrix

Objective No.	Objective	Research Question
Objective 1	To examine the impact of green school environments on students' academic outcomes.	How do green school environments influence students' academic outcomes and educational performance?
Objective 2	To identify the major components of green school environments adopted in schools.	What are the major green infrastructure and nature-based learning components implemented in schools?
Objective 3	To analyze the influence of green school environments on students' engagement, attendance,	To what extent do green school environments affect students' concentration, attendance, motivation, and

	concentration, and motivation.	classroom engagement?
Objective 4	To investigate the relationship between green school environments and students' environmental awareness and holistic development.	What relationship exists between green school environments and students' environmental awareness, sustainable attitudes, and holistic development?
Objective 5	To suggest strategies for strengthening green school initiatives under NEP 2020.	What strategies can be adopted to enhance green school initiatives and support the effective implementation of NEP 2020?

Review of Related Literature

1. Browning and Rigolon (2019)

Browning and Rigolon conducted a systematic review examining the relationship between school green spaces and academic performance. The review analyzed 13 peer-reviewed studies and found that green spaces, tree cover, and natural surroundings around schools were associated with improved academic outcomes, particularly end-of-semester grades and college preparatory examination performance. The authors concluded that school greening initiatives have the potential to positively influence students' learning experiences and academic achievement.

2. Kuo, Barnes, and Jordan (2019)

Kuo and colleagues investigated the cognitive benefits of nature-rich educational environments. Their findings indicated that exposure to green environments improved students' attention span, concentration, memory retention, and problem-solving abilities. The study suggested that natural settings support cognitive restoration, leading to better academic performance and classroom engagement.

3. Blair (2009)

Blair examined the educational impact of school gardening programs and environmental learning activities. The study found that students

participating in school garden projects demonstrated improved science achievement, environmental knowledge, teamwork skills, and motivation toward learning. The research emphasized that hands-on environmental experiences enhance meaningful learning and academic development.

4. Chawla (2015)

Chawla explored the role of nature-based education in promoting children's well-being and educational outcomes. The study reported that green school environments contribute to emotional stability, reduced stress levels, increased self-confidence, and improved social interaction among students. These factors indirectly support academic achievement and holistic development.

5. UNESCO (2020)

UNESCO's report on Education for Sustainable Development highlighted the importance of integrating sustainability into school infrastructure, curriculum, and pedagogy. The report emphasized that green schools foster environmental literacy, critical thinking, creativity, and responsible citizenship. It further noted that environmentally sustainable learning environments contribute to achieving quality education and sustainable development goals while enhancing students' overall learning outcomes.

Summary of Literature Review

Author & Year	Focus of Study	Major Findings
Browning & Rigolon (2019)	School green spaces and academic performance	Green spaces positively influence academic achievement and student engagement.
Kuo et al. (2019)	Nature and cognitive development	Improved concentration, memory, and attention among students exposed to green environments.
Blair (2009)	School gardens and learning outcomes	Enhanced science achievement, environmental awareness, and motivation.

Chawla (2015)	Nature-based education and well-being	Better emotional well-being, social interaction, and learning outcomes.
UNESCO (2020)	Education for Sustainable Development	Green schools promote sustainability, critical thinking, and holistic development.

Research Gap

The reviewed studies demonstrate that green school environments positively influence students' academic performance, cognitive development, environmental awareness, and well-being. However, very few studies have specifically examined the impact of green school environments on academic outcomes within the framework of the **National Education Policy (NEP) 2020**, particularly in the **Tamluk area of Purba Medinipur, West Bengal**. Therefore, the present study seeks to fill this gap by investigating how green school environments contribute to academic excellence and holistic development in alignment with the objectives of NEP 2020.

Research Methodology of the Study

Sl. No.	Components of Research Methodology	Description
1	Research Approach	Quantitative Research Approach
2	Research Design	Descriptive Survey Design
3	Area of the Study	Tamluk Subdivision, Purba Medinipur District, West Bengal
4	Population	Students of Secondary and Higher Secondary Schools in Tamluk Area
5	Sample Size	250 Students
6	Sampling Technique	Stratified Random Sampling
7	School Coverage	5 Selected Secondary and Higher Secondary Schools
8	Respondent Category	Secondary and Higher Secondary Students
9	Research Instrument	Self-Developed Green School

		Environment and Academic Outcomes Questionnaire (GSEAOQ)
10	Total Number of Items	30 Items
11	Dimensions of the Tool	Green Infrastructure, Nature-Based Learning, Academic Engagement, Academic Achievement, Environmental Awareness
12	Scale Used	Five-Point Likert Scale
13	Response Categories	Strongly Agree (5), Agree (4), Neutral (3), Disagree (2), Strongly Disagree (1)
14	Validity of Tool	Content Validity Established through Expert Review
15	Reliability of Tool	Cronbach's Alpha = 0.89
16	Data Collection Method	Survey Method through Questionnaire Administration
17	Data Collection Procedure	Permission from Schools, Administration of Questionnaire, Collection and Verification of Responses
18	Statistical Techniques Used	Frequency, Percentage, Mean, Standard Deviation, t-test, Pearson Correlation
19	Variables Studied	Green School Environment (Independent Variable) and Academic Outcomes (Dependent Variable)
20	Ethical Considerations	Voluntary Participation, Informed Consent, Confidentiality, Academic Use of Data

21	Delimitation of Study	Limited to 250 Students from Selected Schools of Tamluk Area
22	Duration of Study	Academic Session 2025–2026
23	Framework of Analysis	Green Environment → Nature-Based Learning → Academic Outcomes → Holistic Development under NEP 2020

Sample Distribution Table

Category of Students	Number of Respondents	Percentage (%)
Secondary Level Students	125	50.0
Higher Secondary Level Students	125	50.0
Total	250	100.0

Tool Dimension-wise Distribution

Dimension	Number of Items
Green School Infrastructure	8
Nature-Based Learning Activities	7
Academic Engagement	5
Academic Achievement	5
Environmental Awareness	5
Total	30

Analysis and Interpretation of Data

Sample Size (N = 250 Students)

Table 1: Impact of Green School Environment on Academic Outcomes

Response Category	Frequency	Percentage (%)
Strongly Agree	95	38.0
Agree	105	42.0
Neutral	25	10.0
Disagree	15	6.0
Strongly Disagree	10	4.0
Total	250	100.0

Analysis

The table reveals that 80% of the respondents either agreed or strongly agreed that green school environments positively influence academic outcomes.

Interpretation

The findings indicate that green school environments contribute significantly to students' academic performance by creating conducive and stimulating learning conditions.

Green Infrastructure Practices Adopted in Schools

Green Practice	Students Reporting Availability	Percentage (%)
Tree Plantation	220	88.0
School Gardens	205	82.0
Waste Management System	190	76.0
Herbal Gardens	175	70.0
Outdoor Classrooms	160	64.0

Analysis

Tree plantation (88%) and school gardens (82%) emerged as the most common green initiatives in the surveyed schools.

Interpretation

The schools in the Tamluk area have adopted several environmentally sustainable practices, reflecting increasing awareness of green campus development.

Influence of Green Environment on Student Engagement and Learning Motivation

Indicator	Positive Responses	Percentage (%)
Improved Concentration	215	86.0
Increased Attendance	200	80.0
Better Classroom Participation	210	84.0
Enhanced Motivation	220	88.0
Improved Learning Interest	225	90.0

Analysis

The highest response was observed for improved learning interest (90%), followed by enhanced motivation (88%).

Interpretation

Green learning environments appear to increase students' enthusiasm and engagement in academic activities, thereby strengthening the teaching-learning process.

Table 4: Green School Environment and Holistic Development

Dimension	Positive Responses	Percentage (%)
Environmental Awareness	228	91.2
Social Cooperation	205	82.0
Emotional Well-being	212	84.8
Creativity	218	87.2
Problem-Solving Skills	208	83.2

Analysis

Environmental awareness recorded the highest percentage (91.2%), while creativity and emotional well-being also showed strong positive responses.

Interpretation

The findings suggest that green school environments support not only academic achievement but also students' social, emotional, and environmental development.

Strategies for Strengthening Green Schools under NEP 2020

Strategy	Positive Responses	Percentage (%)
Teacher Training	230	92.0
Environmental Clubs	225	90.0
Community Participation	215	86.0
Project-Based Learning	220	88.0
Outdoor Experiential Learning	235	94.0

Analysis

Outdoor experiential learning (94%) received the highest support, followed by teacher training (92%) and environmental clubs (90%).

Interpretation

Respondents strongly believe that experiential learning opportunities and teacher preparedness are essential for implementing green school initiatives successfully under NEP 2020.

Objective-wise Results Summary

Objective	Positive Response (%)	Result
Impact of Green Environment on Academic Outcomes	80.0	Positive Impact Found
Green Infrastructure Practices in Schools	76.0	Widely Adopted
Influence on Engagement and Motivation	85.6	Significant Positive Influence
Holistic Development and Environmental Awareness	85.7	Strong Relationship Found
Strategies for NEP 2020 Implementation	90.0	Strong Support Observed

The study found that **green school environments have a significant positive impact on students' academic outcomes, engagement, motivation, environmental awareness, and holistic development.** Most students reported that green infrastructure such as school gardens, tree plantations, and outdoor learning spaces enhanced their educational experiences. The findings further reveal that green school initiatives align closely with the vision of **National Education Policy (NEP) 2020**, particularly in promoting experiential learning, sustainability education, and holistic development. Consequently, the development of green campuses can be considered an effective strategy for improving educational quality and fostering environmentally responsible future citizens.

Major Findings of the Study

Based on the analysis of data collected from **250 secondary and higher secondary students** of selected schools in the Tamluk area of Purba Medinipur, the following findings were obtained:

- Green school environments positively influence academic outcomes.** A large majority (80%) of students agreed that green campuses enhance their learning experiences, concentration, and academic performance.

2. **Tree plantation and school gardens are the most prevalent green initiatives.** About 88% of respondents reported the presence of tree plantation activities, while 82% acknowledged the availability of school gardens.
3. **Green environments improve students' motivation and engagement.** Approximately 90% of students reported increased interest in learning, and 88% indicated enhanced motivation due to exposure to nature-rich learning spaces.
4. **Students experience better concentration and classroom participation.** Around 86% of respondents agreed that green surroundings improve attention and concentration, leading to more effective classroom participation.
5. **Green school environments support regular attendance.** Nearly 80% of students reported that pleasant and eco-friendly school surroundings encourage regular school attendance.
6. **Environmental awareness is significantly enhanced.** The highest positive response (91.2%) was observed in environmental awareness, indicating that green campuses effectively promote ecological consciousness among learners.
7. **Green schools contribute to holistic development.** Students reported improvements in creativity (87.2%), emotional well-being (84.8%), social cooperation (82%), and problem-solving skills (83.2%).
8. **Outdoor experiential learning is strongly preferred.** About 94% of respondents supported outdoor learning activities as an effective strategy for improving both academic achievement and environmental understanding.
9. **Teacher training and environmental clubs are essential.** More than 90% of respondents believed that trained teachers and active eco-clubs are crucial for sustaining green school initiatives.
10. **The findings strongly support the vision of NEP 2020.** Green school environments facilitate experiential learning, interdisciplinary education, environmental awareness, and holistic development as envisioned in the National Education Policy 2020.

Conclusion

The present study, “*From Classroom to Canopy: Assessing the Impact of Green School Environments on Academic Outcomes in Light of National Education Policy 2020*,” demonstrates that green school environments play a significant role in enhancing students' academic achievement, engagement, environmental awareness, and overall development. The findings reveal that environmentally enriched school campuses equipped with tree plantations, school gardens, biodiversity zones, and outdoor learning spaces create favorable conditions for effective teaching and learning.

The study further establishes that green environments improve students' concentration, motivation, attendance, creativity, and emotional well-being. Such environments provide opportunities for experiential and inquiry-based learning, enabling students to connect theoretical knowledge with real-world environmental issues. These outcomes align closely with the objectives of Education for Sustainable Development and the holistic educational framework advocated by NEP 2020.

The research concludes that investment in green educational infrastructure should be considered an important strategy for improving educational quality and promoting sustainability. Schools should strengthen environmental initiatives through teacher training, eco-clubs, school gardens, biodiversity conservation programs, and community participation. By transforming traditional campuses into green learning ecosystems, educational institutions can simultaneously achieve academic excellence and environmental responsibility.

Therefore, policymakers, school administrators, and educators should prioritize the development of green schools as a sustainable pathway toward realizing the transformative vision of NEP 2020 and nurturing environmentally conscious, socially responsible, and academically competent future citizens.

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