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Green School Model: Best Practices from the Field on Education for Sustainability in India

Abstract

Today's education must respond to the new 2030 Agenda for Sustainable Development by preparing young generations to deal with challenges such as poverty, hunger, inequality, climate change, loss of biodiversity, and natural resource depletion, resulting in negative consequences on human health and livelihood. To achieve this, UNESCO has been promoting Education for Sustainable Development (ESD) since 1992. It led to the UN Decade for ESD from 2005 to 2014 and is now directing its efforts towards the Global Action Programme (GAP) on ESD. A Green School is a school that prioritizes energy, waste, water, food, and biodiversity management in its governance, teaching and learning practices, community partnerships and facilities and operations of the school. The purpose of a Green School is to help students understand our impact on the planet and how to address the colossal social, economic, and environmental problems that we face today. A Green School provides a dynamic and vibrant learning environment as it addresses real-life challenges by practising and modelling sustainability in all aspects. To achieve this, more and more schools are adopting initiatives on five major themes: energy, water, waste, food, and biodiversity, thus empowering various stakeholders to embark on the journey towards sustainable development. The study draws its result using both secondary as well as primary data collected through the tools developed by the researcher. The study is exploratory in nature and presents the analysis on a thematic framework highlighting the strategies that schools can easily adopt to become Green Schools.
Keywords: Green School, Education for Sustainability

Introduction

Sustainable development is considered a "fluid concept" (IISD, 2010, p. 6) as it has been interpreted in multiple ways. Most interpretations of the term can be classified as either "technological" or "ecological" (Orr, 1992). The technological approach emphasises reducing the adverse impact on the environment through technological advancements and new legal rules and regulations while following the same socio-economic growth trajectory. This technological approach is top-down in nature, as it is driven by experts in the fields of science, technology and law, instead of the local community. On the other hand, the ecological approach is bottom-up in nature, as it argues for social transformation by incorporating both expert-driven science and technology-based knowledge as well as the efforts of the common citizen. The ecological approach thus requires collaborative efforts of both experts and people of the community. Presently, the technological approach is more widely accepted and valued, but there is dire need to shift our attention to the ecological approach which often goes unrecognised and underappreciated. To promote this, United Nations dedicated a decade of Education for Sustainable Development (DESD) from 2005–2014, which required "the concerns about sustainable development to be inculcated through education" and the efforts continue with the commitment of the nation towards "Global Action Programme" on ESD (UNESCO, 2005). This paper presents one such model of Green School, empowering young people

to take responsibility for the social, economic and environmental challenges that we face today. The researchers studied manuals, case studies and reports of five organisations working on green schools in India, and analysed the qualitative data based on the principles of framework analysis, to identify the best strategies on the themes of energy, food, water, waste, and biodiversity. Further using the 'whole school approach' and the themes identified, a thematic framework was prepared, and tools were developed for primary data collection from five Jawahar Navodaya Vidyalayas (JNVs) in the Delhi-NCR region. The results present a model that can be adopted in India to make green schools a reality in every aspect—Governance, Teaching and Learning, Community Partnerships & Facilities and Operations (UNESCO, 2016).

Themes Of A Green School

To identify the themes of the Green School, the researcher reviewed 19 most important resources which include books, activity manuals, guides, teacher handbooks, and other documents on green schools, eco-schools or sustainable schools from across the world. Based on the review, the following themes were identified as they were recurring the most.

Table 1: Recurrence of Themes in Literature on Green Schools

Themes	Recurrence (out of 19)	Percentage of Recurrence
Electricity	19	100
Waste	19	100
Biodiversity	18	95
Water	18	95
Food	12	63
Transport	12	63

Whole School Approach

More and more researchers are advocating the whole school approach to operationalise ESD in schools, which hopes to reflect the microcosm of the sustainable society we wish to create. As the name suggests, the whole school approach implies, every aspect of the school culture works towards the goals of sustainability, through its concerted efforts—in governance, teaching and learning, community partnerships, and facilities and operations – and are habituated in the daily actions of managers, administrators, teachers, students, school helpers, and even parents. The principle of the whole school approach is based on Mahatma Gandhi's quote, "be the change you wish to see in the world." This approach helps in changing the culture of the school by practising what is being taught in the school, and thus students learn what is right and wrong by imbibing appropriate attitudes, values and skills. The whole school approach takes into account the following aspects:

1. *Governance*: The vision, mission, objectives and values that sum up a school reflect the specific history, culture and needs of the school and the local community. School governance is reflected in its strategic plans, policies, procedures, guidelines, budgets and in the work of the school committees.
2. *Teaching and Learning*: The philosophical underpinnings, content selected, pedagogical methods and approaches adopted and learning outcomes and their evaluation mechanism governs the teaching and teaching processes of a school.
3. *Community Partnerships*: Associations and partnerships developed by the school for the benefit of the students or the community which it serves.
4. *Facilities and Operations*: School facilities and operations are the systems that are engaging and active, to best harness the power of physical place—including the built environment, surrounding natural environment and the resources that flow through the school. (UNESCO, 2016b)

Operational Definition Of Green School

In this paper, the term Green school is operationally defined as a school that prioritises the following:

1. *Energy Management:* It includes the type of electricity and fuel consumption and its conservation.
2. *Waste Management:* It involves the 3Rs—reduce, reuse, and recycle waste.
3. *Water Management:* It includes harvesting, conservation, treatment of wastewater generated and sufficient delivery of clean water for consumption.
4. *Food Management:* It includes production (local, indigenous, and organic), processing and preservation, and consumption of food.
5. *Biodiversity Management:* It includes care and concern for the plant and animal life.through its Governance, Teaching & Learning, Community Partnerships, and Facilities & Operations.

Objectives Of The Study

1. To identify and define the themes and elements of a Green School
2. To identify ways to make schools green
3. To develop a model of a Green School

Research Methodology

1. *Nature of the study:* The study is exploratory in nature as it explores the initiatives or practices that the schools are adopting to make themselves green.
2. *Population for primary data:* Primary data has been collected from schools of Delhi-NCR who have been part of WWF India's Ek Prithvi (One Earth) Conservation Leadership through Education programme for at least one year. "The programme is an action-oriented environment education model where the whole school is motivated to explore, understand and apply the principles of sustainability in their school ecosystem. It focuses on building conservation leadership among students by enhancing knowledge, skills and action competence to adopt pro-conservation attitudes and sustainable lifestyle choices." (WWF, 2018)
3. *Sample of schools for primary data:* The sample includes those five Jawahar Navodaya Vidyalayas identified by WWF India that are sincerely and effectively implementing the programme in Delhi NCR. The criteria for sample selection include parameters like teacher training, assigning grade-wise responsibility to teachers, time allotted in the time table or academic calendar, documentation work done by the school and the assessment results.
4. *Tools developed:* Table 2 states the tools developed by the researcher for the purpose of research.

Table 2: Tools Developed for the Study

S. No.	Tools	Respondents
1.	Interview schedule for the principals and the teacher coordinator	2*5 = 10
2.	Questionnaire for the teachers	4*5 = 20
3.	Focus group discussion with students	20*5 = 100
4.	Observation schedule	Filled by the researcher

Resources for secondary data

Table 3 shows the resources of the five organisations working on green schools in India that were used for this study.

Table 3: Secondary Resources on Green Schools

S. No.	Resources / Website	Organisation
1.	Paving the Path: A selection of best environmental practices in schools across India	Centre for Science and Environment (CSE)

2.	Paryavaran Mitra Puraskar Exemplar Schools	Centre for Environment Education (CEE)
3.	Wipro's Sustainability Education Program for Schools and Colleges	WIPRO Earthian Program
4.	The Green School Project	The Energy and Resource Institute (TERI)
5.	Towards a Green School: A Manual on ESD for Elementary Schools & A Study of Good Practices on Greening of Schools	National Council of Educational Research and Training (NCERT)

Analysis of the data

Secondary data was analysed first on the principles of framework analysis. Based on the thematic frameworks prepared, the primary data was analysed next.

The qualitative data was analysed based on the principles of framework analysis which involves a five-step process (Ritchie & Spencer, 1994)

1. *Familiarization*: The researcher immersed herself in the qualitative data on green schools by reading various reports, guides, modules and manuals of the five organisations. Through the process, the researcher became aware of the key ideas and recurrent themes, and made a note of them. Due to the sheer volume of data that was available, the researcher studied only five organisations keeping two aspects in consideration—diversity of regions and comprehensiveness of the data.
2. *Identifying a Thematic Framework*: Using the Whole School approach and themes identified earlier, a framework was prepared and tabulated (see Table 4).

Table 4: Thematic Framework of a Green School

GREEN SCHOOL	Governance	Teaching and Learning	Community Partnerships	Facilities and Operations
Energy Management				
Food Management				
Water Management				
Waste Management				
Biodiversity Management				

3. *Indexing*: It involves identifying portions or sections of the data that correspond to a particular set of themes in the framework prepared.
4. *Charting <level 4>*: It implied that the data was then "lifted from its original textual context and placed in charts that consist of headings and subheadings that were drawn during the thematic framework, or from *a priori* research inquiries or in the manner that is perceived to be the best way to report the research" (Ritchie & Spencer, 1994).
5. *Mapping and Interpretation*: Lastly, the data charted was analysed and interpreted based on the objectives laid out for the research, which were to understand the nature of phenomena of green schools and to map the strategies adopted to make the schools green.

Delimitation

The study is delimited to the schools where WWF has been running its 'Ek Prithvi (One Earth) Conservation Leadership through Education Programme' in Delhi- NCR.

Green School Model

The model presented below highlights some of the strategies that schools can adopt to make themselves green.

Governance – Vision, Mission, Objectives and Values of a Green School

An example of the vision, mission, objectives and value statement of the Green School is presented in Table 5. However, each of the schools need to develop their own vision and mission statements based on their strengths and constraints.

Table 5: Example of Vision, Mission, Objectives and Values of a Green School

Vision	Mission	Objectives	Values
The students from the school emerge as citizens who use and consume resources responsibly, champion on the cause of conservation and become problem solvers in the larger community.	Students of classes 5th to 9th participate and immerse in activities based on one of the themes throughout the year.	1. Enable understanding of the environmental issues in the entire school community. 2. Empower teachers with strategies to integrate environmental concerns while teaching any particular subject. 3. Motivate the school community to exhibit environmentally responsible behaviour at all times. 4. Encourage students to raise questions and discuss relevant topics.	Reinforcing compassion, responsibility, respect for all life forms, and commitment in the school.

Governance – Action Plan and Execution

Some of the strategies on action plan and its execution related to the theme of Energy and Waste, are presented in Table 6.

Table 6: Example of Action Plan and Execution in Green School

Green School	Action Plan and its Execution		
Energy	No school vehicle for students and staff residing within 3 kms of the radius of the school. (Source: CSE Paving the Path)	Random checks during recess, free periods using energy monitoring checklist.	Charging monthly parking fee; Waving off parking charges to those car-pooling; giving Green Allowance to those staff members opting for the school bus. (Source: CSE Paving the Path)
Waste	Banning the use of aluminium foil in lunch boxes.	Good on one side paper box can be placed in every classroom.	Collaboration with authorised E-waste dismantler. (Source: CEE Paryavaran Mitra Puraskar Exemplar Schools)

Governance – Team Structure

The model recommended in the paper, proposes to engage students and teachers of Classes V–IX, with each class assigned a specific theme, as stated in Table 7.

Table 7: Team Structure of a Green School

Theme	Teacher(s)	Student(s)	Admin/Office/ Caretaker(s)
Biodiversity	One teacher of Class V	Students of Class V	Gardener
Food	One teacher of Class VI	Students of Class VI	Cooks and kitchen helpers
Water	One teacher of Class VII	Students of Class VII	Housekeeping or maintenance staff
Waste	One teacher of Class VIII	Students of Class VIII	Cleaners or maintenance staff
Energy	One teacher of Class IX	Students of Class IX	Office staff and Electrician

Governance – Monitoring and Evaluation

Monitoring and evaluation of the green practices adopted can be effectively done by setting targets, action to be taken, identifying indicators of progress and documenting the results. Two such examples are presented in Table 8:

Table 8: Monitoring and Evaluation in a Green School

Theme	Target	Action	Indicator of Progress	Result
Water	Maintain per capita water consumption per day (litres) below 25 litres.	Awareness campaign on water conservation.	Reduction in the water bill or units of water consumed.	Reduction in per capita per day water consumption (litres).
Biodiversity	Instil care for the plant life in students.	Engage students in maintaining or creating vegetable garden or fruit saplings.	Students protect and nurture the plants.	Appreciation for plants as well as fruits/vegetables grown.

Community Partnership - Engagement of Parents

Theme Water: Encourage everyone at home to adopt one change to reduce their water use.

Theme Biodiversity: Create a drip irrigation system with plastic bottles for the plants at home, whenever there is no one at home for some days. Alternatively, prepare herbarium during vacations with the help of parents.

Community Partnership – Community Awareness

Theme Waste: Initiate a 'no plastic zone' project called *'Parivartan'* through which the school avoids using poly bags and encourages the use of cloth and jute bags in the school and the local community. In this campaign, cloth bags made by students from waste cloth pieces are distributed free of cost to residents, shopkeepers, and local vendors of the area. Residents are told to get their own cloth bag stitched by the tailors at school free of cost.

Theme Water: 'Our Gardener, Our Teacher'—an initiative that involves asking the gardener to share less-known ways to save water in the garden.

Community Partnership – Learning from the Community

Theme Waste: Understanding who does what? Contemplate the role and responsibility of local Councils (tax for maintenance of sewerage and waste collection, and organising waste campaigns—Swachh Bharat or Swachh Pakhwada Abhiyaan) and national government and agencies, e.g. Municipal Bodies or land fill site; NGOs voluntary sector/charities (helping others locally/globally like e-waste recycling); and commercial companies. This provides opportunities for inviting speakers and experts from different organisations to elucidate how they are reducing waste, environmental impact, and/or take students to site visits.

Theme Water: Organise a field visit to a wastewater treatment plant, a functioning reedbed or composting toilet, and link it with relevant content areas of the curriculum.

Teaching and Learning - Incorporation in Existing Subjects

Theme Water: How I Get Water: Water Flow-Source to Drain

(i) *Key Concepts:* The water that flows through the tap comes from a faraway source. The used/dirty water is drained into the water body nearby, or it seeps into the ground and pollutes it.

(ii) *Before the Activity:* The water cycle is discussed with the students, which they have already learnt in their textbooks. It is highlighted that the water flows and follows a cycle without being polluted. However, once we begin tapping and using this resource, we pollute it.

Students are further encouraged to think where all the water goes after its use. Or if they have ever thought of sorting the used water, cleaning and using it again?

(iii) *During the Activity <level 4>:* Students are asked to draw a flow chart, tracing water from its source in their city to the water point in their home and beyond. For example, rain -> recharges ground water - > pumped and stored in a community tank -> overhead tank at home -> water points at home -> boiled/purified -> stored in container -> wastewater flows down the drain -> drain leads to the river.

The source of water can also be from the river or well.

(iv) *After the Activity:* It is further emphasised that even though water is present in a large quantity on Earth, there are challenges such as scarcity of water, unequal distribution and overconsumption, all of which affects our day-to-day life.

Theme Waste: Biodegradable and Non-biodegradable Waste – What Goes Where?

(i) *Key Concepts:* Biodegradable and Non-Biodegradable Waste

(ii) *Before the Activity:* Students are reminded of two scenarios—a natural forest and a human settlement. The reasons for a difference in the waste situation between the two are discussed. It is shared that the waste that degrades or disintegrates naturally is biodegradable waste, while the waste articles that do not degrade or disintegrate naturally are non-biodegradable. These waste articles continue to accumulate and hence, contaminate the environment.

(iii) *During the Activity <level 4>:* Students are provided with a list of different kinds of waste found around us, and they are asked to categorise the waste items by putting them into the container to which it belongs: non-biodegradable or biodegradable.

The list includes a banana peel, a leather belt, an empty tetra pack of juice, a styrofoam cup, a toothbrush, a used toothpaste tube, a newspaper, a battery, a glass bangle, dry leaves, an apple, a chips foil packet, a dead insect, a roti, a plastic pen, flowers, green leaves, potato, an old notebook, a soft drink can, a cotton rag, a light bulb, cooked food, a plastic bag and a broken glass bottle.

(iv) *After the Activity <level 4>:* Students are explained why it is important to know the degradability of different materials (crucial for waste management). It is further shared that even biodegradable waste can cause problems because people generate this at a rate and in quantities that are too huge for the process of degeneration to take place properly. It is like overloading nature's decomposing machinery.

Teaching and Learning - Interdisciplinary Activities and Projects

Theme Food: Facilitate students in creating a mind map of a 'cup of tea' covering various issues related to each of its ingredients: 1. Water (Social: unequal distribution, Environmental: water cycle, Economic: impacts livelihood) 2. Energy (Environmental: sustainable vs unsustainable, Science: efficient vs inefficient) 3. Tea Leaves (Culture & history of cultivation and trade) 4. Sugar (Science: health issues, Social Science: region of production, industry and trade), 5. Milk (Social: vegan vs milk consumers, Science: allergies and intolerances).

Theme Water: 'Knowing Water in my School' is a project to engage students in a water

mapping exercise wherein they understand the source (geography), storage (maths), quality (science), use (social science) and wastage of water in their school.

Teaching and Learning - Co-curricular Activity

Theme Biodiversity: A tree mapping exercise to help students gather information about each of the trees on the school campus and enable them in preparing a plan regarding the maintenance of trees on the campus, naming and tagging them, deciding locations for plantation and species of trees that can be planted. The mapping is done by dividing students in small groups and allocating to each group the different areas of the school campus with trees. Students go to the designated areas in their respective groups and mark every tree with a number using chalk. Care is taken to avoid counting a tree more than once. The trees are then tagged with details about their name, date of plantation (approximate), native/non-native, and its friends (like birds, ants, squirrel, etc).

Theme Energy: Teach designing of a table calendar illustrating simple but highly efficient energy-saving habits to save and conserve energy. For example, use rechargeable batteries instead of disposable ones, turn off lights when not required, etc.

Teaching and Learning - Professional Development Opportunity

Theme Biodiversity: Providing appropriate resources to teachers like *Tending a Schoolyard Garden* by Nyla Coelho.

Theme Waste: Capacity building of teachers on how to help students reuse the wastepaper generated in the school in various ways, like doing craftwork (cutting patterns in different shapes), covering notebooks, cutting shapes for mathematics activity, for spreading on shelves, for decorating display boards, etc.

Facilities and Operations - School Building

Theme Waste: Composting systems, equipment, pits for different types of waste, like vermicomposting for dry garden waste, can be created by mixing garden waste with cow dung. A channel on the top of the sidewall can be filled with water to keep ants away from the composting pits. Also, put a metal mesh or net above the composting unit to keep insects and flies away. Similarly, biogas plant for wet waste, and microbial culture composting facility for residential waste.

Theme Energy: Install renewable energy generation systems like solar panels for a certain percentage of the total energy requirements.

Facilities and Operations - Surrounding Natural Environment

Theme Biodiversity: Creating theme-based gardens in schools, like colour-based garden (rainbow garden), cactus garden, floriculture plants for smells and textures (sensory garden), specific use like edible garden or kitchen garden or vegetable garden (food garden for growing vegetables like aubergines, lady's finger, cucumbers, green chillies, amaranth, banana, tapioca, etc); a medicinal garden with herbs, flowers and plants used for healing like cardamom, orchid, aloe vera, etc.

Theme Food: A Seed Propagation Challenge is undertaken. In small groups, students collect a range of local indigenous seeds. These could be sourced from a local indigenous nursery, collecting seeds from existing plants at the school or contributions from community members from the fruits and vegetables that they eat.

Facilities and Operations - Resources Flowing through the School

Theme Food: A Healthy Foods Campaign is launched to increase access to healthy foods in school by replacing bottled soft drinks with fresh lemonade or fruit juice, packaged chips with fruit chaat or vegetable salads, etc., thereby increasing fruit and vegetable consumption on campus. Thus, healthy and freshly prepared food items are served like fruit juice, vegetable sandwich,

egg/omelette, rice, roti/poori, pulses/dal, vegetables, porridge, upma, khichdi, curd/buttermilk, lemonade, lassi, etc.

Theme Energy: Switch from LPG to biomass pellets (made of agricultural waste) as cooking fuel. This is done to reduce the carbon footprint as well as the expenses incurred on the cooking fuel.

Conclusion

To make schools green, strong leadership is needed to act purposefully, collaboratively and committedly for the fulfilment of this agenda. Policymakers need to introspect with a new lens to answer questions like what motivates the modern-day student to learn, do contents like waste management, biodiversity conservation, greenhouse gas emissions, malnutrition and others seem more appealing and relevant today; what are we trying to achieve with education, what should our ultimate learning outcomes be, what competencies or skills are needed by the present learners; and lastly, how to stimulate those capabilities?

The study proposes a 'Green School Model' suggesting strategies that schools can adopt on five themes namely, water, energy, waste, biodiversity and food to make themselves green. Further, to create exemplary models of schools exhibiting environmental responsibility in their day-to-day activities, schools need to adopt the whole-school approach, which means embedding 'green themes' in every aspect of the school culture—governance, teaching and learning, community partnerships and facilities, and operations.

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