

## Greening the School Environment: A Sustainable Design and Practice to Create Environmental Awareness and Consciousness among the Learners

Madan Mohan Carmakers<sup>1\*</sup> and Dr. Pragya Gupta<sup>2</sup>

<sup>1</sup>School of Education, Department of Teacher Education, Central University of South Bihar, SH-7, Gaya-Panchanpur Road, Gaya, Bihar

<sup>2</sup>Assistant Professor, School of Education, Department of Teacher Education, Central University of South Bihar, SH-7, Gaya-Panchanpur Road, Gaya, Bihar

### Abstract

A school is more than a physical structure, a harmonious relationship between school environment and surrounding climate as well as structure of the school building. This present study is focused on the effectiveness of green school and green building in achieving the environmental sustainability consciousness among the learners, that is guided the principals of environmental sustainability. The purpose of this paper is to focus on the long term benefit of green school in respect to environment sustainability. The researcher used the secondary data to carry out the present work. Reviewed information regarding green school which had studied in foreign countries has used to understand phenomena of green school effectiveness in environmental sustainability and developing the environmental consciousness among the learners.

**Keywords:** Harmonious relationship; Green Schools; Effectiveness of green schools; Green Building; Environmental sustainability; Environmental consciousness

### Introduction

“Where the quality of life goes down for the environment, the quality of life goes down for humans.” (George Holland) This is a well-accepted fact that humans have always been completely dependent on nature for all their needs. “Early human beings were part of nature” [1] and had harmonious relationships with it. That is why in mythologies of different cultures are without exceptions severely in connection with nature and unanimously accepted that nature is everything. But with time humans started to exploit nature for their ambitious economic and technological development and began to mould the nature more and more to suit their needs. In this process gradually man became alienated from nature and environmental degradation started at an unprecedented pace. As a result, we are not only facing several serious problems i.e. Thinning of the ozone layer, global warming, acid rain, and water, air, and soil pollution, resource depletion etc [2]. but also wars, political and socio-economic instability. Destruction of biodiversity and ecological pressure leading to human concerns like- scarcity of drinking water, food, & fresh air, natural disasters and pandemics, and other health issues are not only in developing countries but also in developed countries too These situations have indicated that this is the high time to change our behaviour towards nature, to cope up with this situation we have to move towards sustainable development [3].

The concept of SD (Sustainable Development) gained worldwide momentum with the publication of Our Common Future by the World Commission on Environment and Development (WCED) in 1987. Among the plethora of definitions on SD, the most widely accepted definition is by WCED —development that meets the needs of the present without compromising the ability of future generations to meet their own needs [4]. Not only this but also the Tbilisi Declaration (1977), International Education programme (IIEP), earth summit -1992, Agenda-21, Millennium development Goals, Decade of education for Sustainable Development (2005-2014) all of this signaling that that education and learning lie at the heart of approaches to sustainable development thus the sustainable development came into the existence in the world momentum [5]. The recent Global Monitoring Report [6] provides several policies. Recently, in September 2019 UNESCO, launched the *Futures of Education* initiative

to re-imagine how knowledge and learning can shape the futures of humanity in a context of increasing complexity, uncertainty and precarity. According the present scenario, preparing students not only to understand and address complex and often global environmental problems but also providing the solution of the socio-environmental problems has become the crucial and critical issues for each and every world citizen in this globe. Therefore, there is an urgent need to provide the such environment including interdisciplinary environmental and sustainability (IES) programme at school level whose goal is to train students to become “sustainability-oriented scientists, leaders, problem solvers, and decision makers” [7, 8].

India as a developing country is facing significant challenges in ensuring a sustained development. To protect the environment is not only the government's responsibility; each citizen must play an important role in maintaining, preserving and conserving the environment. Environmental protection has been laid down under Article 48-A of our Constitution regarded as states responsibility. Environmental protection is a fundamental duty of every citizen of this country under Article 51-A (g). Therefore, education has been considered as the most appropriate tool to prepare an environmentally responsive citizen and aware the people about environmental issues. since 1937 Gandhi's Basic education, Tagore's writing on environmental consciousness and by the Education commission (1964-66) and National policy on Education in 1986 including Programme of Action 1992, emphasized on the need of addressing and including environmental concerns at all levels of schooling. The National Policy states “There is a paramount need to create a consciousness of the environment. It must permeate all

**\*Corresponding author:** Madan Mohan Carmakers, School of Education, Department of Teacher Education, Central University of South Bihar, SH-7, Gaya-Panchanpur Road, Gaya, Bihar, E-mail: karmakarmadanmohan8@gmail.com

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ages and sections of society, beginning with children, Environmental consciousness should inform teaching in school and colleges. This aspect will be integrated in the entire educational process. Consequently, Environmental Education has been one of the priority areas of concern in all the National Curriculum Framework i.e. On 18 December 2003 the supreme court of India also directed that EE should be an integral and compulsory part of the school from I to XII Environmental education has been around for over 50 years and has contributed to environmental sustainability by disseminating skills-building information. The assessment of environmental education suggests it is rather poor, despite several decades of attention to its importance and the assessment discipline has a short history of environmental education [9].

The Green School is a school guided by the principles of environmental sustainability. It seeks to create an environment by fully utilize all resources and opportunities inside and outside the school to sensitize teachers and students for environmental sustainability through active involvement of the community. This is not a one-time phenomenon but demands an on-going, continuous and synergistic effort of all stakeholders towards improving the environment of the school and its surroundings.

The Green School has clean, healthy, protective and green surroundings. It also promotes both the physical and the psychosocial health of learners and others in school. ensures a healthy (provision of health services such as nutritional supplementation and counselling), hygienic (safe drinking water, neat and clean classrooms, playground and parks, etc.) and safe learning environment, with healthy good practices (e.g. a school free of drugs, corporal punishment, and harassment); and brings students closer to nature as far as possible and involves them in taking care of it. Green schools are education buildings that operate in harmony with the natural environment. They are built to reduce energy costs and conserve natural resources, make use of recyclable materials, and operate in a sustainable manner. An effective green school has successfully integrated the concept into school day and serve as a laboratory for practicing conservation where distinct aspects of green design are used as subject area. On the other hand, Green schools contribute to making communities more sustainable, explore solutions to environmental problems, and serve as models of responsible action. (centre for eco literacy). schools are institutional spaces for communities of learners, including both students and teachers. school is an institution where the process of teaching and learning is conducted. The green school design has influence on the students' outcome. Previous study shows that school environment affected the students' achievement stated that green building also known as sustainable building is a structure that is designed, built, renovated, operated or reused in an ecological and resource efficient manner. Green building is design to meet certain objectives such as protecting occupant health, improving employee productivity, using energy, water and other resources more efficiently and reducing the overall impact to the environment [10]. Environment can be performing as "Silent curriculum" that can be provide positive or negative learning experiences studies have shown that school building affects students health and ability to learn so the design of green school that provide healthy, comfortable and productive learning environment and physical learning environment of teaching that can be used as teaching tools for environmental education.

### Definition of green schools

U. S. Green building council (USGBC) had defined the green school as a school building or facilities that create healthy environment that is

conductive to learning as well as saving energy, resource and money. Green schools are education building that operates in harmony with the natural environment, built to reduce energy cost and conserve natural resources, make use of recyclable materials and operate in a sustainable manner. Gordon (2010) stated that green schools is the physical result of the consensus process of planning, design and construction that takes into account a building performance 50-60 years' life cycle, provided clean fresh air, a comfortable temperature range, abundant light and low distraction from unwanted noise while also maximizing the resource efficiency, minimizing pollution and teaching students the importance of innovation in the build environment. Centre for eco literacy define the Green schools as "contribute to making communities more sustainable, explore solutions to environmental problems and serve as models of responsible action". Green schools that are used as a teaching tool for environmental education, educate new generations with the skills to face the environmental challenges of the coming decades and preserve our national resources and environment. Green schools focus on three areas of our domain – cognitive, moral and Behavioural, cognitive aspect includes aimed to developing skills and creative and critical thinking pertinent to solving environmental problem, moral aspect involves advocating tolerance, altruism, compassion, solidarity and understanding between humankind and nature. The behavioural parts entail the application of practices learned in the programme. The Green School has clean, healthy, protective and green surroundings. It also promotes both the physical and the psychosocial health of learners and others in school. ensures a healthy (provision of health services such as nutritional supplementation and counselling), hygienic (safe drinking water, neat and clean classrooms, playground and parks, etc.) and safe learning environment, with healthy good practices (e.g. a school free of drugs, corporal punishment, and harassment); and brings students closer to nature as far as possible and involves them in taking care of it. A green school is about more than curriculum, more than programming and more than bricks and mortar. It's a school that supports global sustainability in every way. A green school begins with the future in mind, designing a learning experience for students that will prepare them to lead the world toward a healthier, cleaner, more sustainable future.

### Characteristics of green building and green schools

The center for green schools under the U.S. Green Building council emphasized the following characteristics of green schools-

1. **Reducing Environmental Impact:**
  - Conserve energy and natural resources
  - Reducing energy and water resources
  - Reducing the usage of fossil fuels in transportation
  - Decreasing landfill waste and conserving natural environments
  - Remove toxic materials from places where the children learn and play
  - Conserve fresh drinking water and surface runoff water
  - Encourage on recycling and promote the habits of protection
2. **Protect the students Health and well-being:**
  - Improves indoor air quality
  - Good nutrition and physical activity
  - Access to clean and safe drinking water

- Employs daylighting strategies and improves classroom sound and noise

### 3. Environmental and sustainable literacy:

- Increased environmental knowledge combined with educational techniques that emphasize on interdisciplinary instructional practices and place-based problem solving that can help modify the student's behavior toward sustainability.

LEED has identified seven categories of rating system to define the characteristics of green school i.e. sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, innovation in design and regional priority. CHPS (collaborative for High performance schools), in California (1999) defines 13 attributes to define the green schools, those are-healthy, comfortable, energy efficient, materials efficient, water efficient, easy to maintain and operate commissioned, environmentally responsive site, a building that teaches, safe and secure, community resource, stimulating architecture, and adaptable changing needs. (2004).

NCERT (2015) also proposed the following characteristics of Green Schools-

#### 1. School building environment:

- **Classroom:** Natural lighted in the classroom from the side of the black board, Provision for artificial lighting in the classroom, lab, library, etc. proper ventilation, cross ventilation, Maintenance of optimum temperature, classroom cleanness etc.

- **Staircase:** Appropriate width of the staircases, moving comfortability for the students.

- **Corridors:** utilization of corridors meaningfully by the students for playing, learning and socializing. Holistic development of the students and ensure their active involvement in all activities.

- **Terrace:** Ensuring the safety of the students

- **Garden:** soft area and free from prickles

- **Play ground:** sand pit, swings, slides, open ground for playing field games

- **Setting for socialization**

- **Drinking water:** safe Drinking water facilities

- **Toilets:** separate toilets for the boys and girls and the children with special needs

- **Building infrastructure:** Infrastructure of the building in accordance with the disaster or any other threat, provision of facilities for the differently able children (like ramps, hand rail etc.), unwanted noise control or any other disturbances, use the building as a learning aids.

2. **Green curriculum:** curriculum should be design as so that learning about the environment, learning through environment, learning for the environment.

3. **Green practices within the schools:** Water preservation and conservation. electricity conservation, garbage management through reduce-reuse and recycle, plantation, use of common school activities, festivals, celebration for addressing the environmental concern and community involvement in these, good connection between parents- teacher to make good habit among the students, no corporal punishment, children-friendly behaviour, emergency or disaster awareness and its preparedness, involvement of stakeholders in school activities.

4. **Food and nutrition's:** adequate nutrition through school menu, maintain nutrition and hygiene during the cooking practice, addressing the equality issue- there should be no discrimination between the caste, gender, race or religion, fuel conservation practices, use of eco-friendly stove etc. maintaining health card – regular health check up of the children.

5. **Community participation/ green practices beyond the schools:** reaching out to the community and ensuring its effective participation in the different activities of the school where not only the school and its students are benefited but the community also receive support in addressing issues related to physical and socio-cultural environment. Promote environmental practices at the community level.

### Sustainable design and practices in school environment: Why it is sustainable design? Justification

1. **Green school as a teaching tool:** learning is not only the acquisition of knowledge rather it is the perfection of hand on experience of the real world problem and well connected with the environment. Children were learning better through example and situational example is the better than the bookish example knowledge. Green school environment will able to provide the learners a real situational problem in front of them by which they can be understood the real environment problem also able to apply in the larger environment with their skills and knowledge. Walden (2015) define the school as "A school is not just a palace for instruction but a living venue for learning and play, as well as meeting place for users from the surrounding community"

2. **Create environmental awareness & consciousness:** Environmental awareness refers to being aware of natural environment and making decisions that assist rather than harm the environment. Using safe and non-toxic building materials, conserving energy and water, recycling, activism, and other methods are some of the ways to develop environmental consciousness. Environmental awareness is a concern towards environment or environmental problems in other word understanding the natural system within the human social system. it is not only the knowledge about the environment but also attitude, values and skills to solve the environmental problems. On the other hand, "Consciousness" means experience or awareness of environmental phenomena which include experiences and perception commonly associate with ours thought, feelings and actions. Sustainability Consciousness refers Knowledge (K) = knowingness (environmental, social, economic), A = Attitude (environmental, social, economic), B = Behaviour (environmental, social, economic), (Olsson. 2014). Green Schools will be provided environmental awareness and consciousness knowledge and skills through the indoor learning activities. Students are able to learner about present environment scenario, develop skills to protect the environment and utilize in the actions. Thus solution can be determining in the primary stage which reduces the environment degradation what was happening in a larger scale.

3. **Use the building as a learning aids (BALA):** Green school building can be used as a learning aids of the children not only for the primary learners but also for the secondary or higher secondary learners. Building structure as well as environment of the school can be able to create the learners' awareness make them capable to act positively towards environmental sustainability. Colours, painting, symbols can be used in the building to create the learner's knowledge, understanding, interest about learning and also learners are able to learn quickly. For example- building walls, stair, corridors can be used for the meaningful painting or source of bookish knowledge such as alphabet, name of fruits, vegetables, poem, environmental awareness painting, few quotes of novel persons, picture etc. that will be help the



learners developing knowledge and understanding in a broader term which will be applicable for the benefit of society.

**4. Green schools as a 3 dimensional text book:** Green school model, environment as well as curriculum followed by the schools will be able to develop the learners cognitive, affective and psychomotor domain which able to developed the learner's knowledge, understanding, and also problem solving skills. The architect design and the surrounding environment will be work as a silent or hidden curriculum also a pedagogy for the little learners, according to "The building should be designed to make the curriculum hidden in architecture and operations art of the formal curriculum. School environments should be understood not only as places that are flexible and integrated but, most importantly, as places that encourage, support and allow the learners to acquire knowledge and develop practical skills while engaged with their social and physical environments." The learners are get the primary contact and exposure to the physical object that make them capable to develop experiential, situational, and problem solving skills, not only those but also environmental and social knowledge. According to Nair (2014) a learning building is where an active learner is supported within an active social and physical learning environment.

**5. Designing the green curriculum:** green curriculum means developing the curriculum as much as connected to the local environment and social environment that not only Learner gets first-hand experience from the environment this experience may be expanded beyond the school and reach to community so the most important fact to developed curriculum and learning situation. This can be done by this following parameter and three domains of learning

#### **Learning about the environment**

Gathering knowledge and skill and understanding to protect our surrounding, so for the making green building process it is important to improve the curriculum on the basic of society needs so the learner have to know the what is the problem of his or her society? Educationist or school management committee and teacher are the pathfinder for the learner to provide the knowledge and understanding that has helps the learner to improve their understanding. Thus they can relate the problem and find its suitable solution. This will help to develop learners' cognitive domain. Students learn environment which will help to develop the learner's knowledge such place, space and environment.

#### **Learning through environment**

Learning through environment means process of learning by engaged with the environment inside and outside of the school environment. For understanding the natural environment, it is necessary to create a biodiverse environment. Inclusion of practical involvement to make the physical environment, it will help to understand the environment by the learner. This will be developing the learner's affective domain and psychomotor domain of learning.

#### **Learning for environment**

Learning for the environment depicts knowledge, skill, attitude towards environment in response to preserve and conservation policy regarding environment, social, cultural heritage or cultural environment. It is the response and responsibilities of the persons to look after nature. So education is such that should be helpful for the learner to develop their knowledge, skill, attitude towards environment.

#### **Environmental sustainability consciousness among the learners' vs green school**

Green Schools is the sprouting concept in the field of environmental

sustainability. As we all know that a school is a miniature of a society so we can expect the broader achievement in the sense of environmental awareness and preserving the environment. Different foreign studies reflect on the effectiveness of green school in achieving the environmental ethos among the students, and also benefits on the environment. Kats (2006) found that green schools provide the financial benefits that are 20 times larger than the conventional schools also reported that green schools use an average 33% less energy than the conventionally designed schools but the schools cost is more than 2% than the conventional schools. U.S. National Research council reported the green school designed had estimated an average water use reduction of 32%. Green schools have guide line some criteria in the effectiveness of the schools such as Indoor air quality, thermal comfort, Day lighting, Water efficiency, and energy efficiency for the class room environment and the evidence found that classroom environment can effect on the children academic progress five separate review on impact of improved indoor air quality on asthma found an average reduction of 38.5% in asthma by improving indoor air quality(Peterson et al.,2010) and the another studies reflect on daylighting in the classroom and the result showed that student performance ranging up to 20% better than non-daylighting classroom.

Another studies reflected on green schools in Suriname by the SUWAMA foundation change in children's behaviour towards environment, study reflect on the significant positive change of children's behaviour towards environment during the monitoring change especially observed in the case of endanger species, recycling activities, energy and water saving. SUWAMA foundation taking some school after monitoring they implement as green school and the result found improved from their previous condition, data were as follows-clean school yards 17%, clean and neat classrooms 10%, biodiversity improvement 39%, school gardens 4%, recycling 48% improvement, energy saving 69%, and the installation of environmental bridges 89% A study also conducted in Israeli to show the effect of green schools on the pupils' environment attitudes and behaviour, two school had chosen one is green schools and another was persistent green schools study was one basic of EE (environmental education) programme taught in the green schools and persistent green schools and the study reflect that EE programme had positive and significant effect on the development environmental attitude among the elementary school's students of Israel. Statistical results in the both case Green school and persistent green schools for the development of environmental attitude was  $\beta = .306, p = .003$  and  $\beta = .167, p = .005$  respectively, in the case of predicting the relation of environmental attitude and environmental behaviour persistent green schools scored higher in the environmental behaviour than the pupils in the regular schools ( $\beta = .161, p = .007$ ) but pupils in green schools did not differ from those in the regular schools with the regards to their environmental behaviour researcher conducted his study in another variable also made assumption that environmental activities outside of the school do affect the environmental behaviour for the regular schools students(  $\beta = .215, p < .001, \beta = .160, p = .002$ ). the study also reflects on that food habit of the pupil's family also reflect on the environmental attitude and the result found stronger environmental attitude for the pupils who were having the vegetarian, also higher environmental attitude ( $\beta = .139, p < .001$ ) found for the case of that pupils who were spending time with the nature maximum time with their parents.. This study also reflects on the effectiveness of eco-schools and non-eco schools to determine the environmental knowledge and awareness, pro-environmental attitude, and pro-environmental action among the learners. In comparing environmental awareness between Eco- Schools (ES) and Non- Eco-Schools (NES) the difference occurs from 6% to 19% in case of some

measuring items some case it varies 10% to 19% in some case of items. Statistically slightly difference exist between Eco-school (where  $M = 8.2$   $SD = 2.4$ ) and Non- Eco school (where  $M = 7.7$ ,  $SD = 2.7$ ) statistical result shown there is slight difference in environmental knowledge between eco-school and non-eco-school but this doesn't mean the true difference and researcher deny his directional hypothesis. In case of attitude the researcher can't not found ES students has higher attitude than NES students. In the case of pro-environmental action there is slightly difference between the two groups but the overall result show that the pro-environmental action is higher among the ES students compare to NES students.

## Conclusion

Learning environment as an active learning source and reflect as a hidden curriculum as well as significantly affect on learning process and shaping the learning environment for the future generation the recommendation of green schools encourages the learners towards environmental responsive citizen and make the human-nature relationship. The finding of the previous study reflects that green school's students exposed stronger attitude towards environment.

## References

1. Kaplan, Stephan (1992) the Restorative Environment. The Role of Horticulture in Human Well-being and Social Development. Ed Diane Relf 134-142.
2. Crohn K, Birbaum M (2010) Environmental education evaluation: Time to reflect, time for change. *Eval Program Plann* 33: 155-158.
3. Margali BS, Rubin OD (2016) Effect of Israeli Green schools reform on pupils environmental attitude and Behaviour. *Soc Nat Resour* 30: 112-128.
4. Okasha R, Mohamed M, Mansour M (2016) Green schools as an interactive learning source. *JAUES* 11: 1091-1100.
5. Dodd MS, Papineau Dominic, Grenne Tor, Slack John F, Rittner Martin, et al. (2017) Evidence for early life in Earth's oldest hydrothermal vent precipitates. *Nature* 343: 60-64.
6. Shaw EC, McNeil BI, Tilbrook B, Matear R, Bates ML, et al. (2013) Anthropogenic changes to seawater buffer capacity combined with natural reef metabolism induce extreme future coral reef CO<sub>2</sub> conditions. *Global Change Biology* 19.
7. Shaw EC, McNeil BI, Tilbrook B (2012) Impacts of ocean acidification in naturally variable coral reef flat ecosystems, *Journal of Geophysical Research*.
8. Hilmi N, Safa A, Reynaud S, Allemand D (2018) Coral Based Tourism in Egypts' Red Sea, *Coral Reefs: Tourism. Conserv Soc* 31-41.
9. Von SK, Cheng L, Palmer MD, Hansen J (2020) Heat stored in the Earth system: where does the energy go. *Earth System Science Data* 12: 2013-2041.
10. Jiang Li-Qing, Carter Brendan R, Feely Richard A, Lauvset Siv K, Olsen Are, et al. (2019) Surface ocean pH and buffer capacity: past, present and future. *Scientific Reports* 9: 18624.