

Pedagogy for Green Building: India

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Abstract

A well established factor across the globe about climate change and Green House Gas (GHG) emissions is a cause of worry. Construction industry contributes one third of energy used and associated emissions across the world. It is necessary to negate impact of major contributor for environment degradation. Efforts are initiated through green buildings, limited to a self driven initiative of engineers, due to lack of awareness among people. Therefore a pedagogical shift from existing normative approach to pro-active approach is necessary to understand, spread awareness and practicality of environment conservation. This paper emphasizes the past, present and the future green building pedagogical practices in India.

The present pedagogy of green building talks about the use of cosmetics like glasses, Aluminium Composite Panel (ACP) etc. in the building. The future pedagogy talks about the uses of sensors and nano technology in building industry. Whereas the evident traces of traditional green building is lacking in existing pedagogical practice as the buildings have been standing through time.

The improvement in pedagogical practice impacts the results in advanced innovative technological research supporting the construction industry. This paper aims at importance of transferring knowledge through imparting structural approach of conveying the green building, material and construction technology at various level of formal learning. Learning should also involve the concepts, practice, pro and cons of skilled labour, cost, life cycle, re-use, self sustainability, impact on the environment, embodied energy, indoor air quality through orientation, water conservation and management, shape, design, energy consumption, carbon credit. This way of learning

will help in achieving objectives of Kyoto Protocol, Rio and various environmental conferences.

Keywords: Green building; pedagogy; formal learning; carbon credit.

1. Introduction

“Green” falls under “cool colour” in colour family / colour wheel. It gives the soothing effect to environment which makes earth the habitable place to live in. The green includes trees, gardens, landscape and vegetation all important for living creature.

“Green building” (also known as green construction or sustainable building) refers to a structure and using process that is environmentally responsible and resource-efficient throughout a building's life-cycle: from starting of design to construction, operation, maintenance, renovation and demolition. These require close cooperation of the design team, the architects, the engineers, surveyors and the client at all project stage. The Green Building practice expands and complements the classical building design concerns of economy, utility, durability, and comfort.

Although new technologies are constantly being developed to complement current practices in creating greener structures, the common objective is that green buildings are; designed to reduce the overall impact of the built environment on human health and the natural environment by:

- Efficiently using energy, water, and other resources
- Protecting occupant health and improving their productivity
- Reducing waste, pollution and environmental degradation
- Use of natural materials for that are available locally

“Sustainability” may be defined as meeting the needs of present generations without compromising the ability of future generations to meet their needs.

Green building brings together a vast array of practices, techniques, and skills to reduce and ultimately eliminate the impacts of buildings on the environment and human health. It often emphasizes taking advantage of renewable resources, e.g., using sunlight through passive solar, active solar, and photovoltaic equipment, and using plants and trees through green roofs, rain gardens and reduction of rainwater run-off. Many other techniques are used, such as using low-impact building materials or using packed gravel or permeable concrete instead of conventional concrete or asphalt to enhance replenishment of ground water.

On the aesthetic side of green architecture or sustainable design is the philosophy of designing a building that is in harmony with the natural features and resources surrounding the site. There are several key steps in designing sustainable buildings: specify 'green' building materials from local sources, reduce loads, optimize systems, and generate on-site renewable energy.

Green construction principles can easily be applied to retrofit work as well as new construction.

2. Pedagogy for Green Building

The term green building is well known to Architects, Engineers, Democrats and few elite people and group of society. It is difficult for them to convince a client to go for green building construction if mass is not aware of the same. The issue to bring this concept to grass root level. This may be achieved through the implementation of green building pedagogy to the initial level of the education say standard 8th or 9th. Indian curriculum talks about the sustainable ideas such as:

- Solar Energy
- Rain water Harvesting
- Wind energy
- Sea waves energy
- Bio gas
- Recycling of waste and solid waste management
- Good living practices

The past as well as present of rural India is the evidence of sustainable building technologies and their implementation. But the urban India has forgotten those basic sustainable concepts and started copying the construction technologies and materials used in western countries. The Idea here is that Indians are well aware of the sustainable technologies but to use and promote them seeks attention.

Indian academics curriculum of initial levels deals about the concepts but not the applications and uses of those in practical life which require the immediate attention to improve, to cope up with the implementation part. Curriculum may be including: *What, Where, How, Why and Try/ Implication.* e.g.

2.1 Environment

What is Environment? Where it is need to conserve? How we may save our environment? Why we should think about environment? Try some of the feature to save environment in own house or school.

2.2 Quality of life

What is quality of life? Where we may improve quality of life? How we may quality of life? Why we should think about quality of life? Try some of the feature to improve quality of life in own house or school.

2.3 Green Building

What is green building? Where it is possible to construct such buildings? How we may built such buildings? Why we should built green building? Try some of the feature in own house or school.

2.4 Solar Energy

What is solar energy? Where it is possible to use in such buildings? How we may use in such buildings? Why we should think of solar energy? Try some of the feature in own house or school out of solar energy.

2.5 Rain Water Harvesting

What is rain water harvesting? Where it is possible to use rain water harvesting? How we may use rain water harvesting? Why we should think of rain water harvesting? Try some of the feature in own house or school out of rain water harvesting.

Similar kind of questions shall be put for all environment friendly, sustainable materials and technologies with their answers in the curriculum for basic understanding of green building. It is of high importance as Construction industry contributes one third of energy used and associated emissions across the world. It is necessary to negate impact of major contributor for environment degradation.

In the pedagogy of green building and research the other line of action may be the use of “Laser Technology” which may prove to be greener way. Laser may be used for precision cutting as well as to save the energy consumption. Laser may be used for display pane in interiors as well as exterior of the building with out wasting material each time for new display products.

3. Parameters of Green Building

Learning should also involve the concepts of cost, life cycle, re-use, self sustainability, skilled labour, environmental Impact, embodied energy, indoor air quality through orientation, water conservation and management, shape, design, energy consumption, carbon credit.

3.1 Cost

Through studies it has found that the cost of green building increases by 10 % to 15 % over traditional building technology. The cost may be recovered from the building operation within 3-4 years in terms of saving the electricity and water consumption.

3.2 Life Cycle

Life cycle of the building is similar to that of traditional building. But energy consumption is lower than the traditional building.

3.3 Re-use

Re-use of water and other re-cycle able material has been given utmost importance in the green building.

3.4 Self Sustainability

Green buildings are self sustainable since the building material used are natural in nature they don't require additional attention to sustain themselves.

3.5 Skilled Labour

Green building Techniques involves skilled labour for construction.

3.6 Environmental Impact

Green buildings are environment friendly, reduces the emission of Green House Gas.

3.7 Indoor Air Quality

Green building takes care of indoor air quality which is important for living condition of human. Adverse effect may cause of sick building syndrome.

3.8 Embodied Energy

Green building do not encourage the products having high Embodied energy.

3.9 Renewable Source of Energy

Green building encourages the use of renewable source of energy like solar energy, wind energy, kinetic energy of water etc.

3.10 Transport

Provide access to the people & places by green mode of urban transport, which includes communications, walking, bicycling Intermediate Public Transport (IPT) modes & others.

3.11 Minimal Architecture

Minimal Architecture means do a lot with minimal available resources to perform the proper function for human inhabitation.

4. Cosmetics in Green Building

Green building is now gaining popularity among the well armed industrial lobby. Instead of going for natural solutions they come up with alternative methods and materials as a solution which involves high cost. A building should be designed in such a way that it should have sufficient light and ventilation which should not require any light during day and mechanical ventilation. But care has not been given in the designing and planning of the building instead try to use cosmetics such as CFL Lights, Low Energy Consumption Air Conditioners and other such type of appliances. The emphasis has given to use of variety of glasses like Reflecting Glasses, UV Resistant Glasses and Fire Resistance glasses instead incorporating fenestration sizes, orientation and climatic zone, shape and size of the building, for example Court yard planning with small fenestration size is suitable for Hot dry climate and linear planning with bigger fenestration size are suitable for humid climate. Use of industrial products has been promoted instead of natural materials for the building construction.

Enhancement of technological innovation talks about use of sensors and nano technology for automatic dimming / switching off lights, fans etc. by this concept it is assumed that people will tend to forget the turning off switches. Instead of new products, practices should be made which inculcate the habit of switching off the light manually since childhood. That will reduce the embodied energy consumption for manufacturing of such instruments.

Innovation and research is needed to improve Indian traditional construction technologies which may fulfill the need and demand of contemporary construction industry. Some of the researches such as thick (60 cm to 100 cm thick) wall have been

replaced by new technologies and research such as “Double wall with cavity”, “Rat trap bond” and “Trombe wall”. Many other such examples are there India just needs to practice such researches in construction industry. Role of academicians are vital in spreading knowledge about green building and associated practices.

5. Kyoto Protocol

The Kyoto Protocol is an international agreement linked to the United Nations Framework Convention on Climate Change, which commits its Parties by setting internationally binding emission reduction targets. Carbon credits and carbon markets are a component of national and international attempts to mitigate the growth in concentrations of greenhouse gases (GHGs). One carbon credit is equal to one metric tonne of carbon dioxide, or in some markets, carbon dioxide equivalent gases. Carbon trading is an application of an emissions trading approach. Greenhouse gas emissions are capped and then markets are used to allocate the emissions among the group of regulated sources.

Carbon credit may be prove as a good source of income for rural areas and industrial, factories etc. by minimizing GHG emission or increasing the trees plants and other environment friendly techniques, which is not tough for Indians. Promotion and knowledge of such business opens should be promoted through education system.

6. Conclusion

It is demand of time to think seriously on the pedagogy of green building to save our environment and resources for our future generation. Pedagogy of green building should start from very initial and grass root level only then it will be possible for architects and engineers to convince their client to go ahead with green building. Green building proves to be a good business venture for entrepreneur. But the use of cosmetics should be avoided in the name of green building. It is high time to research on our traditional technologies and improves them to meet with the present requirement instead of copying from west.

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