

Impact of Inclusion of Information and Communication Technologies in School Facilities and Effective Learning of Students in Green School

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Abstract: Future leaders of the nation, teachers and students are progressively exposed to think about sustainable practices and challenges in schools around the world to reconsider and redefine their missions, to modify and restructure their teaching and learning practices and campus life. Despite the increasing quantity of research on green schools, there has been comparatively less published literature about how teachers and learners in a green school use technology enabled methodology, especially from a holistic point of view. This study focuses on how school facilities use technology-enabled learning that might improve learning outcomes and health & well-being as an essential component of learning in Green Schools. 21 personal interviews were conducted as part of this study, which employed a case-based methodology. The target age group was determined and the age group of the selected students was set at thirteen to fourteen years, who were studying in seventh and eighth grade. The data collected by personal interviews was analyzed by using Leximancer tool. It was perceived that the facilities offered by Green schools are profoundly beneficial for affecting the learning outcomes by influencing the attitude of students. By providing context for our observations, we emphasize and conclude that as a learning platform green schools, can help to affect children's mood and thus improve their learning outcomes while maintaining their physical, mental, emotional, and social well-being. In nutshell, the results would apprise and assist decision-makers including policy-makers, building specialists, architects and teachers in designing green strategies and policies for Green schools.

Keywords: School facilities, ICT, Technology-enhanced learning, Green schools, Mood, Health-promoting schools.

1. Introduction

Humans with their regular and inhuman activities have been degrading the environment for ages. Environmental degradation happens when there is an uncontrolled extraction of natural resources. Local environmental concerns like water contamination, air pollution, waste disposal, soil degradation, and deforestation need to be resolved through effective policies at the regional level while global environmental issues like global warming need to be resolved through cross country resolutions. The concept of education for environment is to make people aware about their environment and issues related to it.

The constitution of the Republic of India adopted in 1950, reflected various environmental issues as per (Central Statistics Office, 2015). The initial foundation of environment ethics emerges from its very inception starting from its curriculum to all the other activities based in the school. Every school reflects more than just a physical structure or the textbooks as the environment of the school

plays a major role in the daily lives of students because a meaningful interaction with teachers, students and their peers add life to it. According to (Sharma & Pandya, 2015) Green schools make sure that their staff and students prudently utilize the available resources keeping in mind the concept of sustainability.

To save the earth's environment and fixing up causes of environmental degradation by using a set of policies and procedures aimed at environmental concerns can be defined as Environmental ethics. The practical purpose of these environmental ethics is to provide moral and ethical grounds for framing social norms and policies to be adopted by the people in context of human relationships to the environment. An understanding of environmental ethics impacts our ability to observe and resolve environmental issues as different people have different viewpoints.

For a student, human values become a key factor while considering environmental ethics because they need to know and understand the importance of these values to check and evaluate individual actions and events related to their environment.

School facilities impact teaching and learning in reflective way research has shown that. However, policymakers at regional levels often overlook and ignore the impact of school facilities that can play a vital role in improving outcomes for both instructors and learners. Improvement in

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the quality of facilities and resources offered by Green schools appear to be a costly affair initially. But when the positive impacts of these facilities are gained in terms of improved teaching and learning experiences and outcomes by teachers and students, the total profits of such financial investments usually outshine the cost of the investments by these schools. Thus, policymakers should focus on the impacts of facilities and adopt a long term cost effective viewpoint on the efforts to improve school facilities.

As some of the researchers have noticed that most of the schools lack facilities like adequate infrastructure, labs, and learning space, apart from general maintenance and construction issues. Moreover, half of them do not have flexible teaching and learning space for effective teaching and learning to take place. Thus, quality of school facilities is an essential predictor for student learning and retention of teachers. The emotional and physical well-being of teachers and students depend on healthy buildings essentials i.e. location of school, quality of facilities provided which makes school campus safe and sound.

Upgrading the quality and standard of facilities and resources offered by schools appears to be a costly affair. But when the positive impacts of these facilities are harvested in terms of improved teaching and learning experiences and outcomes. The overall profit can be deciphered in terms of student and teacher retention (no leaves and absenteeism) and better emotional and physical health such rewards of financial investments outshine the cost.

Many schools suffer from “sick building syndrome” owing to poor indoor air quality and are also responsible for absenteeism and unsatisfactory performance and outcomes of students. It has been found that dampness and poor indoor quality aggravates common childhood diseases like allergies, asthma etc. Other indoor pollutants like paints, floor cleaners, pesticides and office equipment can also negatively affect students’ health and performance in schools with poor ventilation systems.

A green school enhances their quality of life by providing a unique learning environment that balances ecology. Therefore, green schools enhance learning by providing an appropriate sustainable environment for all its stakeholders. (Sharma & Pandya, 2015).

2. Literature Review

Environmental degradation is an undesirable disturbance to the environment by harmful agents. It destroys natural resources, natural ecosystems, and wildlife. This is leading to the depletion of natural resources in terms of both quantity and quality (Tyagi, Garg & Paudel, 2014).

Environmental degradation is affecting many countries and India is not an exception. Overpopulation, intense economic

activities, and overuse of natural resources are the major factors contributing to environmental degradation in India. (Chopra). There is a need to teach people to explore all the problems related to the environment, and engage in wise ways of preserving it. Studies in the review demonstrated that environmental education has led to a number of positive impacts, from improving academic performance, to enhancing critical thinking skills, to developing personal growth and life-building skills including confidence, autonomy, and leadership. (<https://naaee.org/eepr/research/eeworks/student-outcomes>).

Humans need to be more environmentally educated and responsible to understand the effects of environmental degradation. The concept of environmental education is gaining immense popularity and spreading through national education policies and curriculum development initiatives. (Rickinson, 2002). Environmental education is one of the most effective ways to create awareness for environmental protection and improve the quality of life through sustainable development. (Alexander.R, 2012). Environment education programs create more awareness and sensibility towards the environment and connect the people with the environment. (Grimmette, 2014). Worldwide educators have expressed that a solution to environmental crises lies only in generating proper awareness about it and the idea should be deeply rooted at all levels in the school education system. (Shobeiri, Omidvar, & Prahallada, 2007).

India is a nation diverse in terms of geography, culture, and climate so the environmental education programs are location specific and caters to children and women. (Siddiqui & Khan, 2015). Keeping this in mind, MHRD in collaboration with NCERT has taken important steps to include environmental education at school and university levels. The Ministry of Environment and Forest initiated the concept of the National Green Corps (NGC) Program in 2001-02 intending to generate environmental awareness among school children through the creation of Eco-clubs. (Singh). NGC aims to educate children about their environment and their dependence on these ecosystems. In 2005-06, Eco clubs were in existence in nearly 68,000 schools across India, which reached 97,000 in 2007- 08. (Roberts, 2009).

According to (Verma & Razdan, 2018) a Green school is the outcome of specific planning, designing, and construction that is in sync with nature, a process that considers a building’s performance over 50 - 60 years. (Gordon, 2010) explained that the purpose of building a green school is to inculcate the importance of innovation, by creating a sustainable environment to maximize the best use of available resources, providing a comfortable temperature

and abundant light, reducing distraction, air, water, and noise pollution.

An understanding of fulfilling our present needs without letting our future generation to compromise for the same is the essence and concept of sustainable development.

2.1. Green schools - The concept of education for sustainable development

A Green School is a knowledge acquisition platform involving a perfect blend of general and environmental education, which comprises students and teachers, where teaching and learning happen simultaneously (Freiberg, 1999). The structure and design of a green school are considered to be the core component, having a noticeable impact on the results shown by an individual, therefore the healthy environment and facilities provided by green schools influence the overall learning progression, experiences, and outcomes related to it. Some studies show that the school environment plays a vital role in affecting the students' achievement. Many elements contribute to achieving an increase in students' learning outcomes and providing enhanced quality of education. (Rudd, Reed, & Smith, 2008). The green school design was considered and implemented in India under Sarva Shiksha Abhiyan (SSA) "Green School Project" an initiative of Govt. of Gujarat to attain the aims of creating healthy school environment (www.gujarat-education.gov.in, 2020).

The layout, structure, and design of these green schools, surroundings and good indoor air quality are the main components that help in creating and fostering a knowledge space termed as Sustainable or Green school. (National Research Council, 2007)

Any structure or building that is planned, constructed in a way that could renew, recycle, and reuse itself in a resourceful and eco-friendly way is considered to be sustainable.

2.2. Green school Rating system – Focus Areas by IGBC.

1. Sustainable sites
2. Energy efficiency
3. Water efficiency
4. Material & Resources
5. Indoor Environmental Quality (IEQ)

2.3. Merits of Green schools

Green school plans are a cost-effective mode of education with realistic operational expenses that promoting quality education, enhances the learning experience of students, maintains general health & fitness and inculcates effectiveness in these schools (Kats G., 2009) As compared to traditional schools, Green schools offer financial as well

as other fringe benefits. These schools provide better indoor learning surroundings to students and concurrently teach them how to conserve water and energy resources. According to (Gordon, 2010) low maintenance and operational cost of green schools help in cost-cutting, this amount is used for the betterment of students in terms of recruiting teachers, planning, organizing events, activities, and buying equipment for schools.

Augmented learning and noticeable results in the performance of the students is associated with school facilities like well-lit classrooms and better acoustics, improved indoor air quality and comfortable room temperatures. Green schools provide a safe, healthy, efficient, and profitable learning atmosphere that serves as a tool for teaching and enables hands-on experience for acquiring real knowledge for a better understanding of sustainability by students. Benefits of green and sustainable schools may be considered in terms of better health of students' which reflects a decrease in the number of student dropouts, good scores in assessments, and retains school teachers by reducing operational cost. (Kats G., 2009). It is a commendable contribution made by teachers, students, parents and the community to reduce pollution, save the environment and mankind.

2.4. Green schools Vs Normal Schools

Green schools emphasize the need for practices based learning, contribution oriented activities, supportive techniques to create a healthy, comfortable, safe school environment, a place where teachers and students work together to create a sustainable environment for present and upcoming generations by engaging the whole community (NCERT, 2014). Normal schools are centers for learning but are not entirely committed to create a sustainable future, these traditional schools lack participation of society and unique features of the sustainable concept and environment-friendly approach to a large extent.

A study by (Schneider, 2002) determined that environmental conditions play an important role in students' success. These factors were supported by research from Penn state university (<https://sites.psu.edu/ceepa>, 2020). Five primary aspects of school facilities required to enhance learning outcomes are good air quality, proper lighting, noise and acoustics, comfortable room temperature, size of class rooms and open spaces which is almost similar to the concept of Green school model of India based on the following environmental elements (Air, Water, Land, Energy, Waste and Built Space). Research has shown that an appropriate amount of natural light helps in the morale-boosting of teachers and students by minimizing off-task behavior and increases assessment scores. It is evident that artificial lighting has negative impacts while natural lighting has positive impacts on the students' learning experiences.

According to (<https://sites.psu.edu/ceepa>, 2020) one study shows that students with the maximum exposure to natural daylight improved faster in comparison to those students who were taught in environments with the least amount of natural light.

2.5. Learning in Green schools

Green school facilities develop a synergistic relationship with learning and whole school sustainability. The use of effective school infrastructure, design and facility in a green school enhances the value of environmental education among students. (Barr, Leigh, & Dunbar, 2011). Research has proved that the school environment affects the attitude and preferences of students towards learning and education. It improves their skills, motivation level, level of self-esteem, and level of engagement in schools. (Rudd, Reed, & Smith, 2008)

According to The Pennsylvania State University, research studies have found that the overall learning experience, engagement of a student and performance of a teacher are associated with school facilities and resources available to them during school hours. These studies indicate that school facilities can have a reflective and visible impact on teachers' performance and students' learning outcomes. Various school facilities like **good air quality, proper lighting, noise and acoustics, comfortable room temperature, size of class rooms and open spaces and technology enabled teaching and learning modes are those specific** school facilities which affects a teacher in terms of recruitment, commitment, efforts and retention, while school facilities affects a student in terms of behavior, learning, engagement, health, overall growth, development and achievements.

Thus, research generally concludes that adequate resources and facilities are mandatory for improving student outcomes and teacher's performance as in absence of required resources and facilities it becomes difficult to serve a large number of students and acts as a hurdle in the teaching learning process.

2.6. Knowledge Gap

A lot of work has been done on the benefits of green schools in protecting the environment. Research has also been done on the effect of school infrastructure on the learning process of students. But nothing has been done to study in detail the role of school facilities in affecting the mood of students towards learning in green schools especially in a developing country like India. This research paper addresses this issue in detail. At the same time, the research covers a whole range of school facilities rather than just the infrastructure to study the effect on the mood of students.

2.7. Research Objectives

1. To understand the concept of mood as perceived by students of green schools.
2. To understand the role of school facilities in influencing the mood of students towards learning in green schools.

3. Research Methodology

The research is qualitative in nature. It involves a detailed analysis of the role of school facilities in influencing the mood of students towards learning in green schools in India. A case-based approach has been followed and one school in Gujarat has been selected. Gujarat has many green schools and the concept of green school started in this city. The school selected for this study is B-Kanae School, Modasa. The reason for selecting this school is that it's the first green school in India that has won many national awards and ranked among the top 100 schools in India and top 10 schools in Gujarat. It is also the first member school of Green School Alliance in India and certified by IGBC (Indian Green Building Council). 21 in-depth interviews have been conducted among students of this school. The students selected are in the age group 13-14 years studying in class 7th and 8th.

The interviews were taken in two phases. In the first phase, students were interviewed to find out what they meant by the concept of mood. The responses were then analyzed through the Leximancer tool and the concepts generated were used to frame the next level of interviews with the students. The discussion guide in the second level was aimed to understand how the level of school facilities influences the mood of students towards learning. Leximancer tool was used for the analysis of the data.

3.1. Analysis and Interpretation of Data

The data was collected from primary sources using an in-depth interview technique. Detailed analysis and interpretation were carried out using Leximancer tool, after the collection of data and information from 21 respondents.

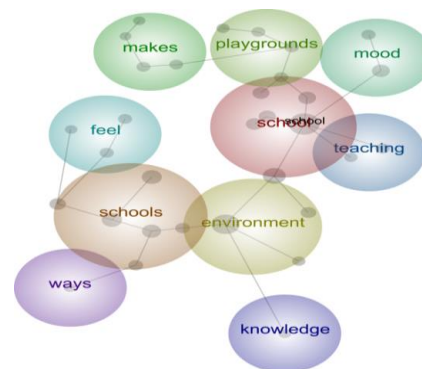


Fig. 1: Simulation Model for Relationship of Mood and students' learning experiences

However, the mood is directly/indirectly, related to students' learning tendencies depending upon the external or internal factors affecting the mood. If they are happy and motivated, they will study attentively but if they are upset, they will find it difficult to learn and understand. In such cases, the environment of green schools plays a vital role in being a mood elevator or stress buster for students. Also, some students were very specific about environmental issues, as they feel connected to nature and believe in preserving it.

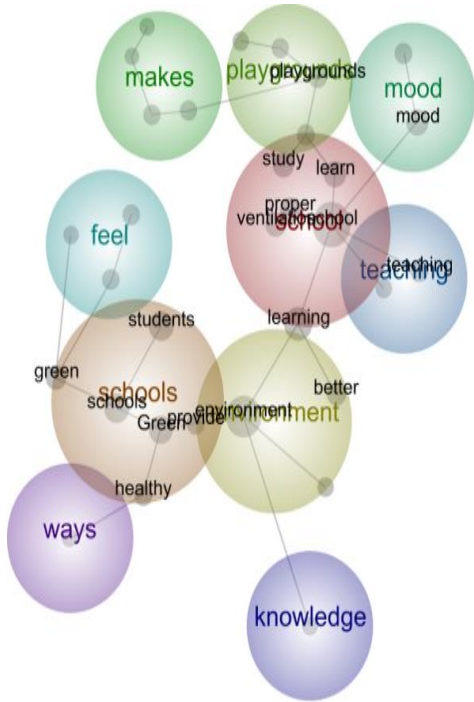


Fig. 2: Simulation Model for Impact of External or Internal factors on the mood of students

Figure 2 illustrates the reasons why students prefer green schools? The environment of Green schools acts as the main mood elevator during school hours as per the information collected through the in-depth interviews. Nowadays, students do not have enough time to stay connected with the environment due to changing lifestyles and preferences. Green schools have done a commendable job by introducing nature to their day-to-day life with the help of Green curriculum, green buildings, and eco-friendly learning spaces. The majority of the students have a deep affinity for their green school.

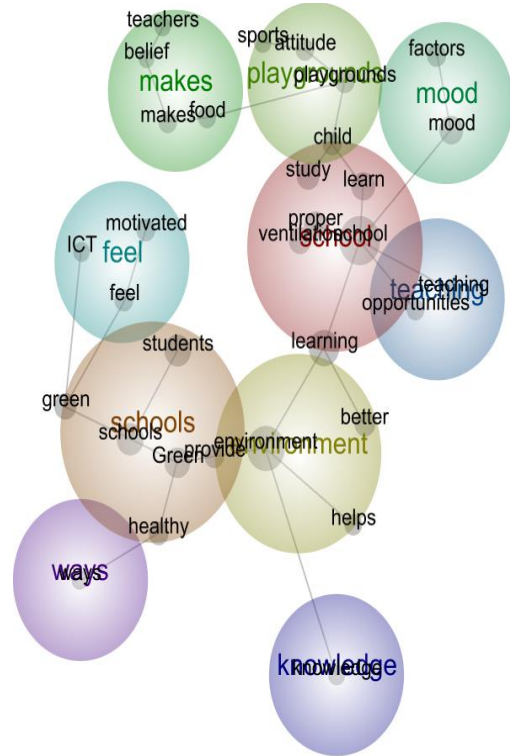


Fig. 3: Simulation Model for Accessibility of learning tools and learning opportunities in school

Figure 3 clarifies the additional division and assessment of variables, like appropriate IAQ, instructional, and learning opportunities in schools. Owing to the accessibility of various learning tools, students are changing their learning inclinations from blackboard to either practical or online learning. In the present situation, students choose to learn a concept by adopting practical and live demonstrations on a daily basis. Feedback and reviews from students help the subject teacher to design their teaching methodology. A significant role is being played by the mood of an individual in enhancing the learning outcomes, particularly in the case of those students who easily get distracted, for such students learning by doing is the best teaching tool as they get involved and engrossed in the activities and such focused involvement helps in learning the concept.

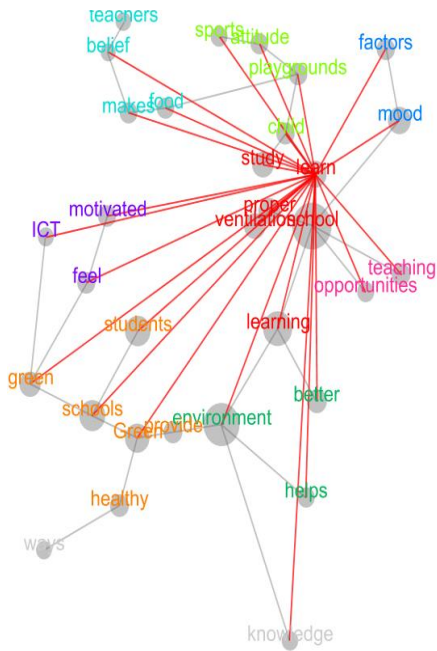


Fig. 4: Projection of Connection between green school, ICT, healthy learning environment, mood, and motivation

Figure 4 illustrates the linkage between green school, ICT, healthy learning environment, mood, and feeling motivated. According to the information received through in-depth interviews conducted it reveals that most of the students feel motivated and happy during school hours. This can be ascribed to the variables such as:

- Tech-savvy kids of today's generation make comparative analysis for best, easy, and fun based learning, which gives them a new and everlasting learning experience. What makes a difference to them is how they understand and learn the complex concepts conveniently, with no issues?
- Accessibility of innovative methods for teaching and learning.
- Knowledge acquisition along with concern for the environment is the basic mantra of Green schools and an important factor in favorably influencing the students' learning outcomes by providing the best facilities in terms of a healthy learning environment, IAQ, Practical spaces, ICT, and community-based assignments.

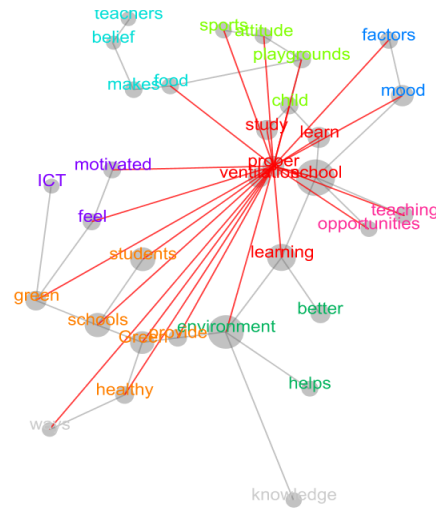


Fig. 5: Projection of Relationship between the various factors, which influences learning during school hours

Figure 5 displays the relationship between the various factors, which influences learning during school hours. As discussed, students' learning outcomes significantly relies upon the mood of the learners as well as the area where (place) and how (method) it's being conducted, in the classrooms or practically i.e. playgrounds or open spaces? It was observed that if the mood of the student is good, they learn with efficacy and retain for a longer duration. However, students in a bad mood, try to give excuses and seem to lose interest leading to unlearning.

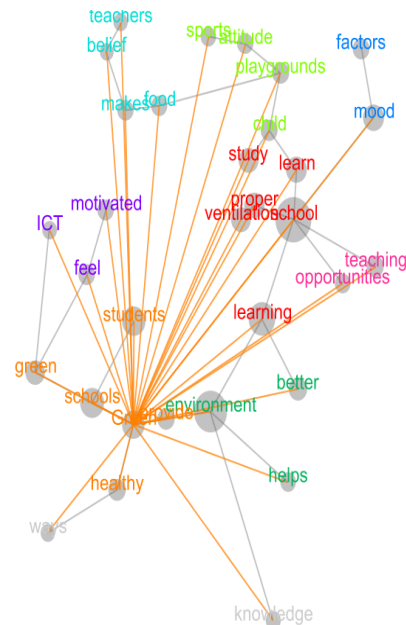


Fig. 6: Comprehensive Projection analysis of different factors impacting learning outcome of students

Figure 6 provides a comprehensive analysis of different factors, which impacts the learning outcomes of students. It was observed, the majority of students prefer learning through ICT that aids enhanced learning due to ease and helps to preserve the environment by reducing paper waste. (Verma & Razdan, 2018) This can be attributed to the commitment of students towards a sustainable environment and quality education offered by the green curriculum of green schools. According to this research, most students showed an inclination towards quality education along with environmental education and all-round development through extra-curricular activities and projects that connect them to society and nature. Thus the learning methodology of the students depends upon their learning needs as well as available school facilities.

4. Conclusion

Detailed analysis and interpretation of interviews with Green school learners, revealed that mood along with green school facilities and environment plays a dynamic role in persuading learning outcomes. Online and practical learning is the first preference of today's students as they are aware of their responsibilities towards preserving the environment which is leading to changing their learning inclinations from chalk and board to online platforms. This can be attributed to the ease of learning and availability of different options at a single platform. (Verma & Razdan, 2018) However, the students feel that learning in Green school is a great experience because of the unique green curriculum that offers education while making them aware of environmental issues and social responsibilities (community-based projects) thus keeping them connected to their roots. Hence, mood influences the learning choices or preferences of the students to a great extent. During this research, it was observed that focused and enhanced learning takes place when students are in a good mood and distraction from studies and lack of interest was displayed when students were in a bad mood. Therefore, we may conclude that Green school facilities and environment help to bring a smile on their faces by elevating their mood to a great extent.

4.1. Key takeaways include

- School facilities, the environment of the school and mood affect the learning decisions of the students' thus influencing learning outcomes.
- Technological advancement, use of ICT, innovation and learning with ease, is influencing students' inclinations towards online learning and thus they are contributing towards minimizing paper waste and promoting a carbon negative environment.

4.2. Limitations of Research

- The students of classes 9th and 10th could not be covered due to their non-availability.
- Since mood is an abstract term, the answers at some point may have gone vague.
- The research is case-based and restricted to one Green school in India.

4.3. Future Scope of Research

The research could be further extended to study the correlation between mood and the different parameters of green school design and infrastructure. This can help researchers understand how different parameters in a green school design can act as mood elevators for students. This case-based approach can be further extended to a bigger sample with more than 10 best schools in India and the sample can be widened for better results.

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