

Biophilic Educational Spaces and Child Mental Wellbeing: Empirical Evidence on School Vegetation and Bird Gardens in Rawalpindi, Pakistan

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Abstract

The school setting can be a significant factor in children's psychological health, concentration and learning. Schools that are rapidly urbanizing have seen a reduction in opportunities for children to experience direct contact with vegetation and biodiversity and an increase in the use of hard surfaces such as concrete in the school environment. This study aims to explore how pupils perceive their school landscapes in relation to their mental wellbeing, and the value of trees, plants, hedges, soft landscaping and bird gardens in terms of their educational engagement. Primary data was collected from 4 educational institutions of Rawalpindi

(Pakistan) from 200 students ranging from 8-16 years, including Army Public School, F.G. Sir Syed Public School, Beacon House school and Ambrose Hall school. For each institution 50 respondents were included. Structured questionnaires were used to collect data which were then analyzed using frequencies and percentages. The findings show that there is a great deal of dissatisfaction with the current school grounds with 77.0% of the respondents not being satisfied. On the contrary, 81.0% of them felt mentally refreshed in green environment, and 85.0% related more with plants and study or academic efficiency. Moreover, 90.0% of the respondents rated health benefits, 82.5% rated decreased boredom, and 70.0% rated benefits for the visual aspect. Around 76.0% of the students also agreed to the introduction of bird gardens. The results support the principles of the Attention Restoration Theory and the research on restorative environments. The findings of the study suggests that the inclusion of vegetation and biodiversity in the educational environment could be beneficial in creating attractive, restorative and child-centred school environments. It suggests minimising the standards of soft landscape, encouraging school bird gardens, providing shade in green spaces and the more significant involvement of environmental and horticultural professionals in school planning. The study examines the importance of school yard greening (SYG) in fostering child mental wellbeing using a biophilic design approach based on attention restoration theory and restorative environments with the inclusion of bird gardens. The study investigates the role of school yard greening (SYG) for the mental wellbeing of children through biophilic design principles and attention restoration theory and restorative environments that include bird gardens, which are also part of environmental psychology.

Keywords: Biophilic Design, Child Mental Wellbeing, School Landscaping, Attention Restoration Theory, Restorative Environments, Bird Gardens, Environmental Psychology, Schoolyard Greening, Pakistan

1. Introduction

A large proportion of children's time is spent in educational institutions. Therefore, the physical world around them can affect how comfortable they are, their behaviour, their concentration, how they socialise and their overall wellbeing (Brogan & Douglas, 1980). A school is more than a building, a place where learning is done. The classrooms, corridors, playgrounds and gardens, trees, pathways and other outdoor areas all contribute to a learning and development environment (Pellegrini, 1993).

In many cities, the school yard is becoming more concrete, asphalt and dusty and has more hard surfaced features such as boundary walls. These areas can be practical and hygienic, but offer limited opportunities for children to experience nature. This is of particular concern in urban areas where children might not have the same chance to experience nature outside of school. There is a large body of evidence to support the restorative effect of natural environments in environmental psychology. Attention Restoration Theory (ART) is a theory developed by Kaplan (1992) which proposes that there is a natural environment that can restore directed-attention fatigue. Natural entices are often considered "soft fascination" sources, because a person does not need to push his mind to the extreme to pay attention to them as he would to many educational or urban activities.

In the same way, Ulrich (1984) psycho-evolutionary view suggests that natural environments can evoke positive emotional reactions and aid in stress reduction. Theories of these effects, which need to be investigated further, offer an important basis to consider vegetation as a part of educational design, instead of just an ornamental element.

In the built world, biophilic design incorporates natural elements and opportunities for contact with the natural world. Biophilic elements in schools can include trees and flowering plants, hedges, lawns, gardens, outdoor spaces with natural views, shaded outdoor spaces, edible gardens and bird and other small wildlife habitats (Ghaziani & Fisher, 2025).

The attention given to school development in Pakistan has been mainly towards the development of infrastructure such as buildings, classrooms, roads, and boundary walls. The quality of the landscape may not be dealt with as systematically, however, in the outdoor landscape (Latif & Amin 2003). This is a moment to rethink the school environment as a place that can support children's psychological recovery, awareness of the environment and education.

In the present study, the perceptions of students are discussed in four educational institutes of Rawalpindi. In particular, it explores the perceptions of school grounds that are not satisfactory, the students' perceived benefits of vegetation, and students' interest in bird gardens. The study will seek to give empirical evidence for planning the landscapes and creating more child-friendly learning environments.

2. Theoretical Framework

2.1 Attention Restoration Theory

Attention Restoration Theory (ART) by Kaplan (1992) and Kaplan is an important theory to understand the psychological value of natural environments. ART has a theory that people have very little ability to focus on directed attention. Focusing on more challenging activities can lead to attentional fatigue.

Children's needs are the same when they are at school. They need to focus on lessons and follow instructions, complete work, manage distractions and behave appropriately with their teacher and peers. The outdoor breaks may then offer a chance for psychological recovery.

This process can be facilitated by natural environments, either through soft fascination or other means. Fans of windy trees, flowers, birds, varying sunlight and other natural elements can catch the eye rather easily. A green schoolyard can then create a more restorative environment than a hard-surfaced schoolyard.

2.2 Psycho-Evolutionary Perspective

The general idea of Ulrich(1984) psycho-evolutionary theory is that there may be a connection between nature and the reduction of stress. Views of vegetation and other natural features might evoke positive emotional responses which can aid psychological healing.

Physiological measures like cortisol, heart rate or blood pressure are not measured in the present study. Instead, it explores the students' own feeling of mental refreshment, health, boredom, academic productivity and visual well being.

2.3 Biophilic Educational Design

The aim of biophilic educational design is to reinforce the link between children and nature in school. The planting of vegetation can offer shade, enhance visual quality, promote biodiversity, and provide opportunities for resting and informal learning (Ghaziani & Fisher, 2025).

Bird gardens are especially important because they offer the opportunity to integrate landscape design with environmental education. Learners can explore the lives of birds, plants, insects, and changes through the seasons, and the relationships between them. These areas can, therefore, have a psychological, as well as an educational, value.

3. Materials And Methods

3.1 Study Area

The study was carried out in four educational institutes of Rawalpindi, Pakistan namely:

1. Army Public School
2. F.G. Sir Syed Public School
3. Beacon House School
4. Ambrose Hall School

The above institutions were chosen to study students' attitudes towards the outdoor schools in an urban school setting.

3.2 Sampling

There were a total of 200 students. For each institution 50 respondents were included. Participants were between the ages of 8 and 16, and were split into two general age groups: 8-12 and 13-16. The study applied stratified sampling technique in order to be representative of the four institutions.

3.3 Data Collection

Structured questionnaire was used to collect the data. The questionnaire was conducted in English language and Urdu language was provided to help understand the younger respondents.

Questions inquired about the students' level of satisfaction with the current school grounds, and their thoughts on how vegetation impacts on health, school efficiency, boredom, mental refreshment and vision. The students were also inquired whether they liked the introduction of bird gardens or not. The overall response rate was 100%.

3.4 Data Analysis

Descriptive statistical techniques were used to analyse the data. The major variables were coded and frequencies and percentages were computed. Comparisons were also made school-wise to find out whether there are differences in the level of satisfaction. The data obtained from this research is in the nature of association between the students' perceptions as reported

from the questionnaire, and is based on a cross sectional research. These are not intended to be viewed as evidence for the direct effects of vegetation on mental health and school performance.

4. Results

4.1 Student Satisfaction with the Quality of the School Environment

The results show that there is a considerable lack of satisfaction with the current school grounds. Of the 200 who responded, just 46 students (23.0%) said they were happy with their school grounds. Overall, 154 students (77.0%) were not happy.

Table 1. Overall Student Satisfaction with Existing School Grounds

Category	Frequency	Percentage
Satisfied	46	23.0%
Not satisfied	154	77.0%
Total	200	100.0%

It is clear from the high level of dissatisfaction that many students may feel that the current outdoor school environment is not suitable for recreation, relaxation and positive interaction with nature.

4.2 School-Wise Satisfaction

There were differences ($0.05 < p < 0.07$) among the four institutions. The satisfaction and dissatisfaction figures for Army Public School were 30.0% and 70.0% respectively. Out of 340 students, F.G. Sir Syed Public School had 34.0% satisfaction and 66.0% dissatisfaction. 16.0% of Satisfied and 84.0% of Dissatisfied customers were recorded at Beacon House while Ambrose Hall recorded lowest satisfaction with 12.0% and Dissatisfied 88.0%.

Table 2. School-Wise Satisfaction with Existing Grounds

Institution	Satisfied	Not Satisfied
Army Public School	30.0%	70.0%

F.G. Sir Syed Public School	34.0%	66.0%
Beacon House School	16.0%	84.0%
Ambrose Hall School	12.0%	88.0%

While there are differences in satisfaction levels, the majority response was from the dissatisfied in all four schools.

4.3 Perceived benefits of plants

Pupils mentioned some benefits they thought they could get from plants and green environment. There was a strong association between health improvement and 90.0% of respondents. 85.0% reported on study or academic efficiency and 82.5% linked vegetation to decrease in boredom. 81.0% said they felt refreshed mentally and 70.0% said they felt it was beneficial for their vision.

Table 3. Perceived Benefits of Vegetation

Psychological/Health Dimension	Respondents	Percentage
Health improvement	180	90.0%
Study/academic efficiency	170	85.0%
Boredom reduction	165	82.5%
Mental refreshment	163	81.0%
Vision enhancement	140	70.0%

Based on these results, it can be concluded that students' perception of vegetation is high.

4.4 Analysis of The Students' Preference For Bird Gardens.

The students' preference for Bird Gardens was analyzed. Some 76.0% of students agreed to planting bird gardens at school. This discovery shows great interest in biodiversity learning areas in schools.

Bird gardens can be a way for the students to observe bird and plant life and can also be a great addition to the outdoor space. These areas might also be used for biodiversity education and promote awareness amongst students on biodiversity.

5. Discussion

The findings of the study show overall the students are generally interested in greener and more pleasing school environments. The finding of 77.0 per cent of respondents being unhappy with their current school grounds is especially significant as it represents a significant gap between the current school landscapes and pupils' preferences. The high percentage of positive responses for vegetation are in line with the principles of Attention Restoration Theory. Mentally refreshing in green surroundings – students reported on their mental refreshment in green surroundings, indicating that vegetation might play a part in creating a more pleasant and restorative outdoor experience.

It is also significant that the respondents answered positively to the question of their study and academic efficiency with 85.0%. The result is however to be taken with a pinch of salt. The present study does not measure actual academic achievement, rather perceptions. So it can't prove that plants directly have an effect on examination results or learning outcomes. However, if students think that green spaces have a beneficial impact on their ability to learn, decrease boredom, or make them feel better, these perceptions are important for school landscape planning.

Another 82.5% of the respondents linked vegetation with improvement of boredom, which also illustrates the value of environmental variety. A landscape with trees, flowers, shrubs and birds can create a variety of visual and sensory experiences that can be more interesting than a plain concrete surface. 81.0% of students reported that it was good for their minds to take the break. This finding is in line with the theory of restorative environment and indicates that the grounds of school can play a significant role in recess. School planners should not only see recess areas as places of physical activity, they could be considered as potential restorative areas. The high number of people who support bird gardens is also important. Bird gardens can offer several advantages. They can enhance the aesthetic value of school grounds, advance the conservation of biodiversity, facilitate the learning and teaching of environment and inspire an up-close and personal view of nature.

The findings are similar to those found in recent studies on greening school grounds, which have shown links between greening and cognitive and social functioning with children (Verheyen, 2025). But, more experimental and longitudinal research is required to establish the size and persistence of these effects.

6. Policy And Design Recommendations

Based on the findings the following recommendations are proposed.

6.1 Minimum Green-Space Standards

Educational authorities may wish to set minimum standards for new and existing schools with regard to soft landscaping. Space for trees, shrubs, flowering plants and gardens should be incorporated into a school plan.

6.2 Development of Bird Gardens

Bird gardens should be developed in schools that provide locally appropriate plantings that provide food and habitat for birds. These areas may also be used as a component of environmental sciences and horticulture learning.

6.3 Shaded Outdoor Areas

For recess and informal learning, shade should be provided with the use of trees and other landscape features. This can enhance the ambiance of the outside environment, while also allowing for students to engage with natural elements.

6.4 Student Participation

School landscapes should be designed and/or renovated with the students in mind. They can be used to gain insights into child preference for type of outdoor space that is attractive and useful.

6.5 Professional Landscape Planning

Needs programs include co-ordinated activities among horticulturists, landscape architects, environmental scientists, teachers and school administrators in planning educational landscape (Latif & Amin 2003). A combination of disciplines may be able to provide satisfactory compromise of maintenance needs, ecological concerns, safety, educational requirements, and psychological wellbeing.

6.6. Gender-Inclusive Environmental Leadership

It is time to increase the involvement of women in the landscape decision making process in education, as environmental scientists, horticulturalists, educators and planners. Multi-professional viewpoints can support a child-centred approach to environmental planning.

7. Summary

There are a number of limitations in the study. First, the sample comprised of 200 students from four institutions in one urban area and so the results may not be representative of all schools in Pakistan. Secondly, the research was largely self-reported perception based. Third, objective measures of academic performance, physiological stress, attention and long-term psychological effects were not assessed. Lastly, there is a lack of causal inferences due to the cross-sectional design.

Future study should include longitudinal study and quasi-experimental. For instance, schools could be studied before and after their green spaces were installed and changes in students' attention, behavior, academic performance, and wellbeing could be measured. Some objective physiological and behavioral information could prove helpful.

8. Conclusion

The results of this study reveal a clear need amongst students for a greener, more restorative learning environment. 77.0% of the 200 students surveyed were unhappy with their present school grounds and large numbers felt that vegetation contributes to health, academic efficiency, less boredom, a mental refreshment and wellbeing value.

The results validate the importance of the concept of biophilic design and restorative-environment in the planning of educational landscape. The trees, flowers, hedges, gardens and bird-friendly planting should not be considered decorative. They may be able to enhance the environmental conditions of the school campus and offer psychological rehabilitation, environmental education and awareness of biodiversity (Ghaziani & Fisher, 2025).

It is therefore recommended that there should be a collaboration between the educational authorities, school administrators, horticulturalists, landscape professionals and environmental scientists in order to boost vegetation and biodiversity in school grounds. Practical elements of

future school landscape planning should include the development of bird gardens, shaded green spaces and student-friendly gardens (Latif & Amin 2003).

The present research does not allow for direct causal inferences with regard to academic achievement or mental health status; however, students' strong positive perceptions offer a strong foundation to explore the impact further. Longitudinal studies can help to establish if investing in biophilic school environments leads to measurable cognitive, behavioral, stress and wellbeing outcomes for children.

In the context of fast changing and fast emerging Pakistani educational landscape, green schools grounds provide a vital chance to reconnect children with nature and make educational spaces healthier, more vibrant and more nurturing.

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Statements

9.1. Author contributions:

This manuscript has been seen by all the authors who have accepted the entire responsibility for its content and who have approved its submission.

9.2. Conflict of interest

The authors have no potential conflict of interest to disclose.