

EXPLORING THE GREEN SCHOOL SPACES EFFECTS ON THE COGNITIVE DEVELOPMENT OF LEARNERS

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ABSTRACT

The increasing apprehension regarding the standard of educational settings, especially in metropolitan areas, has led to a focus on incorporating natural aspects into school spaces due to their possible cognitive advantages. This study employs a qualitative methodology to explore the firsthand experiences of children who are fully engaged in green school environments. The objective is to reveal the complex relationship between natural surrounds and cognitive development. The study examined N = 6 students aged 12–16 years and N = 4 teachers aged 25–35 years from two schools. The criteria for the selection of schools were to select those that have green spaces. This qualitative research strongly supports the idea that green spaces in schools are essential for creating a positive and effective learning environment. Green space areas in the school provide cognitive development for learners. Green space areas have an impact on the school learning environment as well. In this study, it has been found that there is a high need for green spaces in schools in Karachi for the holistic development of the children. Because students feel relaxed, comfortable, and active. Students are positive about spending time in green school spaces.

Key words: Green school spaces, Cognitive development, Learning Outcomes, Critical Thinking, Secondary School.

INTRODUCTION

In contemporary times, there has been an increasing acknowledgment of the significant impact that environmental influences have on the cognitive development of children in educational environments (Fayaz et al., 2023a). Considering this recognition, the incorporation of green areas into educational institutions has emerged as a potential approach to fostering comprehensive development and knowledge acquisition among students (Buriro et al., 2023). Human interaction with green spaces is considered an essential component for cognitive development, which can lay the groundwork for better cognitive development and an extended and happy life (Dadvand & Sunyer, 2018; Buriro et al., 2023). Schools' outdoor conflate common areas play features with natural elements like gardens, forests, and green spaces to serve multiple purposes and create a better environment (Lashari et al., 2023).

Additionally, they usually feature outdoor classrooms and other children-focused learning environments (Bates, Bohnert, & Gerstein, 2018) engaging with the natural world has been associated with numerous positive outcomes (Buriro et al., 2023) throughout one's life (Lashari et al., 2023).

Mental health improvement reduces risk of cardiovascular diseases, such as diabetes and heart disease (Jimenez, Hart, & James, 2021). Healthy aging improved (Bauwelinck & Dadvand, 2020) and mortality reduced (Plasència & Nieuwenhuijsen, 2016). Furthermore, children who have access to the surrounding green space at school have been shown to do better academically (Bushra et al., 2024) however, most of the supporting data came from an ecological study that used a school-level design for research (Rigolon, 2019). Research on the relationship between childhood residential green

spaces and cognitive development at the individual level has grown in number. In a sample of 456 4- to 6-year-old Belgian kids, more green space in homes was linked to better cognitive development, attention, and psychomotor performance (Rasking & Nawrot, 2022; Keijzer & Dadvand, 2016; McCormick, 2017).

The systematic reviews provide an overview of research on the relationship between children's cognitive development and greenness (Siry & Markevych, 2023). Green schools provide a large amount of outdoor time for children, and these experiences have an impact on the children's cognitive development (Joyce, Chundeli, & Vijayalaxmi, 2023). Research indicates that children who play in green areas have better overall fitness, cognitive function, concentration levels, and behavioral skills (Mårtensson, 2009; Kelz, Evans, & Röderer, 2015).

Children's responsibility and positive social relationships are fostered by school outdoor environments (McCormick, 2017). Particularly in impoverished areas, lush greenery may be a vital resource to lessen these urban irritants and promote healthy development for kids. The health benefits of green spaces have been demonstrated to be greater for those residing in impoverished areas with lower socioeconomic levels; nevertheless, the research is conflicting (Marselle, 2020), and achieving equitable access is still difficult in many European cities (Barboza et al., 2021). Increased time spent in green spaces during classes may have enhanced cognitive abilities through the benefits of green spaces' attention-restoring properties (Amicone et al., 2018). Green spaces may also improve cognitive function by reducing inflammation-causing urban hazards like pollution in the air and noise (Saenen et al., 2023).

There are various measurements that can be used to display various components of exposure to green spaces. Since proximity to green spaces may serve as a stand-in for access, the linear or walking distance to green spaces from various everyday locations measures potential accessibility. The frequency of visits to and time spent in green spaces can be used to indicate how people use them. Labib et al. (2020) provide the exposure's chronological dimensions. Despite the strong correlations observed among several of these indicators, they indicate distinct aspects of exposure. Short travel times between the house and the school to green spaces might only be

one aspect of availability, since access is dependent on factors other than just physical distance, such as reliability, security, and operating hours. Furthermore, it is conceivable that distinct mechanisms may have a stronger correlation with aspects of exposure to green spaces (accessibility versus availability). Rather than focusing on the length of contact, most of the earlier research has focused on metrics related to green space availability and accessibility (Labib, et al. 2020). Furthermore, not much research has looked at being exposed outside of homes and educational settings (Browning & Locke, 2020; Khan, Lashari & Iqbal, 2022). We look at the data that is at present accessible regarding the relationships among students' performance & the green space surrounding schools in this systematic review (Suhag et al., 2017; Bushra et al., 2024). The research focuses on studies that specifically examine educational results for children and young adults, such as achievement on standardized assessments, grades at the end of a term, and assessments that prepare students for college. We selected these metrics because, in comparison to alternative metrics, they offer more reliable measurements for comparing academic achievement across schools (Catalano & Hawkins, 2000). For the following reasons, we prioritize the green spaces on and around school campuses over those that are close to students' homes. First, school administrators have more authority over these spaces (Buriro et al., 2023) because they can decide whether to green school grounds or collaborate with the local community to carry out other greening projects (Jeynes, 2005). Secondly, there is huge gap to address the effects of green school spaces and areas on cognitive development of learners (Lee, & Westphal, 2018; Bushra et al., 2024; Buriro et al., 2023; Parvaiz, et al., 2024). Thirdly, a growing number of school choice initiatives provide communities the option to select any school within an area, irrespective of where they currently reside (Ely & Teske, 2015).

There is a correlation between improved cognitive development and being in green spaces (Buriro et al., 2023). Children's cognitive development may also be impacted by this kind of exposure, however there isn't much epidemiological data to support this theory. There is still much to learn about the possible effects of green school spaces on children's cognitive development in Karachi's urban setting, where concrete classrooms predominate (Pervaiz, et al., 2024). The need to comprehend how adding green

areas to schools in Karachi affects students' cognitive development is critical as interest in nature-rich learning environments expands globally (Lashari et al., 2023a). In this session, the lack of qualitative research makes it more difficult for us to comprehend the varied experiences and viewpoints of teachers and students about how green school spaces affect cognitive development (Lashari et al., 2023b). Thus, by undertaking a qualitative investigation. This study aims to close this gap by elucidating the complex relationship between children's cognitive development in Karachi and their exposure to nature in a school setting.

Research Questions

1. How do green school spaces contribute to the cognitive development of children?
2. How do green school spaces in Karachi influence the cognitive development of children?

Literature Review

The variety of ways that kids engage with the outdoors and the kinds of activities they engage in has been illustrated in literature on school outdoor environments (Jansson, Abdulah, & Eriksson, 2018). Children's ability to focus has been enhanced in a number of ways when they engage in green spaces (Amicone et al., 2018). When children can gain practical experience and control over greenery, they are more probable to interact with natural environments (Jansson & Mårtensson, 2012). There is a major impact on children from families with few resources developing up in those relatively impoverished urban neighborhoods (Bates, Bohnert & Gerstein, 2018). Research indicates that children who participate in outdoor learning activities possess enhanced critical and creative thinking abilities (Cronin & Jones, 2010; Kavita, Kkang & Lashari, 2024). Schools are perceived as psychological and educational environments that prioritize learning when they are situated outdoors. School outdoor activities encourage student participation (Lashari et al., 2023a). They also encourage physical activity as a means of improving health and wellness (Larsson, Rönnlund, & Larsson, 2021; Balouch, et al., 2023). Children who live in excellent outdoor environments report feeling happier, among other positive health outcomes (Söderström et al., 2013).

Green School Spaces

A green school is one that conserves energy, the environment, money, and resources while fostering a healthy learning atmosphere. an environmentally conscious school. 1. Lowers expenses and environmental effects. The idea and necessity of Green Schools were developed during the 2002 World Summit on Sustainable Development (WSSD), which was held in the city of Johannesburg (Buriro et al., 2023; Fayaz et al., 2023). It's important for all individuals to understand that the future of humanity and our planet is in jeopardy if we continue to misuse and overexploit our natural resources in our quest for development led to the introduction of this concept in Europe in the 1990s (Bushra et al., 2024; Parvaiz, et al, 2024). Since the introduction of the idea of "Green Schools," the emphasis has been entirely on the kids, motivating them to use the right tools to take the required steps on social, economic, and environmental issues—all of which are critical issues that need to be solved right now (Lashari et al., 2023). Urban greening initiatives unquestionably have a significant positive impact on our cities and neighborhoods. We can achieve these advantages and provide residents with better mental and physical health outcomes as well as increased city sustainability by planning our urban areas with a greater sense of purpose (Lashari et al., 2023; Parvaiz et al., 2024). Green spaces and other natural environments offer children unique possibilities that have been shown to positively influence various aspects of cognitive development.

These include motivating basic emotional states like wonder, engagement, risk-taking, creativity, mastery and control, and strengthening sense of self (Bowler, Buyung-Ali, Knight, & Pullin, 2010). A school's level of greenness has been linked to improved student achievement (Wu, et al. 2014). Your prior cross-sectional study of breath respondents demonstrated the protective effect of green spaces at home and at school against behavioral issues like hyperactivity and neglect (Amoly, et al., 2014).

Cognitive Development

Thinking, reasoning, and understanding are examples of intellectual abilities that undergo growth and change. This process is referred to as cognitive development. It encompasses the gathering and assembling of knowledge (Lashari et al., 2023a). Talking to your infant and naming everyday objects are two examples. Allowing your infant to play and

explore toys, reading and singing to your child, from the age of eleven to adulthood. Learning and reasoning, including the improvement of memory, symbolic thought, and problem-solving abilities, are the main components of cognitive development (Khan, Lashari & Iqbal, 2023). Cognitive development is demonstrated when a school-age child completes a math problem, asks questions about what they have read, prepares a snack, or learns to knit (Suhag et al., 2023; Kaviat, Kang & Lashari, 2024). Think back to some other instances of cognitive development you have seen in school-age kids. We are aware that experiences have an impact on growth and development and that the brain develops over time (Bukhari, Lashari & Jillani, 2024). The theory of cognitive development, put forth by developmental psychologist Jean Piaget, explains how a child comes to understand the world. He characterizes development as an outcome of interactions with the surrounding environment (Fayaz et al., 2023). Cognitive development occurs in four stages, according to Piaget. Although the age at which a child moves through each stage can differ, all children go through the stages in the same order. Stage of sensory-motor (0–2 years old) Stage of preoperational (2–7 years old) Stage of concrete operation (7–11 years old) Formal operational stage. Children of school age spend their days in organized learning environments. School-age children can use your program as a place to make new friends, explore interests, learn new skills, and put their knowledge to creative use. It can also give them the space and time they require to absorb everything they are learning (Lashari et al., 2023). Spend some time going over the following tactics, which highlight methods to assist the school-age children and youth in your program in developing their cognitive skills:

1. Provide a range of engaging and challenging materials for kids to play with. School-aged children can practice their cognitive skills with model airplanes, jigsaw puzzles, musical instruments, woodworking, and crafts.
2. Provide open-ended, free-choice play opportunities. Even though school-age children are now receiving their education in more structured settings, play is still crucial to their cognitive development.
3. Ensure that there are an abundance of books and writing supplies available. Offer compelling, kid-friendly fiction and nonfiction. Give kids access to reference materials so they can learn more about

subjects that interest them. Establish a relaxing, peaceful area where people can read and write.

4. Under adult supervision, use technology that is age-appropriate. Children of school age can learn to write code, play computer games, and use the internet to research topics that interest them.

5. Give students a feeling of responsibility. Involve them in the decision-making process regarding alterations to the space (e.g., selecting plants for the lobby, deciding whether to construct an outdoor stage, etc.). Assign genuine tasks such as maintaining plants and tidying up program areas. People who stress the social dimensions of cognitive development may concentrate on the various cultural norms and conversational strategies that need to be learned within a culture (Rogoff, 2003). Prenatal and early postnatal periods are thought to be the most susceptible times for the effects of environmental exposures because this is when the brain develops steadily (Grandjean, Landrigan, 2014). We had seen that indoor EC was linked to negative effects on cognitive development in previous breath analyses (Sunyer, et al. 2015).

Effect on Green School Spaces to Cognitive Development

Our cognitive development is greatly influenced by our surroundings. This impact has both potential benefits and drawbacks (Buriro et al., 2023). Environmental influences typically have an impact on cognitive development by supplying stimuli that affect the brain, nervous system, and senses—organs involved in cognition (Bukhari, Lashari & Jillani, 2023). In green areas like parks, gardens, grasslands, and farms, children are more likely to participate in physically demanding outdoor activities to improve cognitive development (Kjønniksen, Wiium, & Fjørtoft, 2022).

Studies revealed that kids participate in a range of physical activities on the school's green spaces and that their rates of cognitive development gradually increase. In the green schoolyards, a lot of kids socialize with their peers (Bates, Bohnert & Gerstein, 2018).

Green space access improves cognitive development (Bikomeye, Balza, & Beyer, 2021). The green spaces of the school grounds motivate cognitive development (Hendry & Yee, 2019). offers chances for constructive play (Boulton & Thomas, 2022), imaginative play (Samborski, 2010), and socio-dramatic play (Mårtensson et al., 2014).

Green spaces have a positive impact on cognitive development that can be attributed to direct influences like the ones mentioned above, or it can occur indirectly through mediated pathways. The capacity of green spaces to reduce air pollution caused by traffic (Dadvand, et al., 2015). Given that exposure to TRAP has been adversely linked to children's cognitive development, this could result in a positive effect of green spaces on cognitive development (Sunyer, et al., 2015). Furthermore, it has been proposed that being close to green areas, especially parks, increases cognitive development (Hart., & Laden., 2015). A significant portion of children's active daily lives are spent in schools, and "green exercise" has been linked to improved cognitive development (Coon, et al. 2011).

Methodology

The research uses qualitative research method for exploring the green school spaces effects on cognitive development secondary schools level students in Karachi. The data was collected through the semi structure interviews from teachers and students from the schools of Karachi. Secondary level Teachers and students of private schools. N=10 sample size n=6 students and n=4 teachers (1) Progressive green land and secondary school (2) Green land public school.

Results

The results of this phenomenological study shed light on the perceptions and experiences of six teachers from private schools in Karachi and four secondary school students regarding the effects of green schools on the cognitive development of learners. Through in-depth interviews, participants provided rich insights into various aspects of green schooling and its impact on cognitive development.

Themes Emerged from Teacher Interviews:

Enhanced Cognitive Engagement

Teachers consistently reported that green school environments fostered enhanced cognitive engagement among students. They noted that exposure to natural elements such as plants, greenery, and outdoor spaces positively influenced students' focus, attention span, and overall cognitive functioning.

Improved Learning Outcomes

Participants highlighted that green schools contributed to improved learning outcomes. They observed that students exhibited heightened creativity, critical thinking, and problem-solving skills when exposed to green environments, leading to academic success and holistic development.

Stress Reduction and Emotional Well-being

Teachers emphasized the role of green schools in reducing stress levels and promoting emotional well-being among students. They noted that access to natural surroundings created a calming atmosphere, which facilitated stress relief, emotional regulation, and a positive learning environment.

Connection with Nature

A recurring theme among teachers was the importance of fostering a connection with nature in educational settings. They observed that green schools encouraged students to develop a deeper appreciation for the natural world, leading to a sense of environmental stewardship and sustainable behavior.

Themes Identified from Student Interviews

Enhanced Concentration and Focus

Students expressed that green school environments facilitated enhanced concentration and focus during learning activities. They described feeling more attentive and motivated in classrooms adorned with greenery, which positively impacted their cognitive abilities and academic performance.

Stress Reduction and Relaxation

Participants highlighted the role of green spaces in promoting stress reduction and relaxation. They reported feeling more relaxed and at ease in outdoor settings, which translated into improved emotional well-being and overall cognitive functioning.

Stimulated Creativity and Imagination

Students articulated how green schools stimulated their creativity and imagination. They described engaging in imaginative play, exploration, and problem-solving activities inspired by natural surroundings, fostering cognitive development and innovative thinking. It helps to develop focused learning, learning with enjoyment and active memorization of concepts and clear understanding of the concepts.

Awareness of Environmental Conservation

A prevalent theme among students was the heightened awareness of environmental conservation fostered by green schools. They expressed a growing sense of responsibility towards protecting the environment, inspired by their experiences in eco-friendly educational settings.

Discussion

The research strongly supports the idea that green spaces in schools are essential for creating a positive and effective learning environment. The investigation into the effects of green school spaces on the cognitive development of children presents a compelling avenue for understanding the intricate relationship between environmental factors and educational outcomes. By exploring how exposure to nature within school environments influences cognitive functions such as attention, memory, and problem-solving skills, this research contributes to a growing body of literature highlighting the importance of creating healthy and supportive learning environments. Through interdisciplinary collaboration and stakeholder engagement, this study seeks to not only uncover the potential benefits of green school spaces but also inform practical strategies for enhancing school design and curriculum to optimize children's cognitive development. Ultimately, the findings from this research have the potential to guide educators, policymakers, and community stakeholders in creating environments that promote holistic well-being and academic success for children across diverse educational settings. Student engagement and being surrounded by nature, but these green areas also boost their energy, foster engagement, and contribute to mental relaxation. Moreover, the aesthetic appeal of green spaces positively influences students' personalities and aligns with the goal of sustainable development. Beyond just looking nice, having green spaces in schools is crucial for holistic education. Students are most active in green school environments, feel more active in classroom engagements, feeling stress release in classes and focused attention towards even the difficult subjects. Students can enjoy studying in the garden. Teachers cannot face problems studying in a green school environment. Teachers and students benefit from studying in a green school setting. Students are more active in their physical and mental well-being in a green school environment.

Green spaces in schools are more than just pretty decorations; they're super important for making learning a positive experience. Think of them as essential ingredients that really impact how students feel in school. All private schools in Karachi can provide green spaces in the school for students. Include green spaces in school for flowers, plants, grass, and trees, and regularly base classes in the green spaces. Teachers can motivate the students to study green spaces. According to the results of the study, teachers believe that green spaces help in cognitive engagement of the learners. It also helps to develop better learning outcomes and emotional wellbeing of the learners. Learners feel a strong connection with nature, and they contribute to the eco-system of the schools by planting, gardening or other activities. The study showed that greenspaces have great impact on positive on the cognitive development of the learners.

Conclusion

The aesthetic appeal of green spaces positively influences students' personalities and aligns with the goal of sustainable development. Beyond just looking nice, having green spaces in schools is crucial for holistic education. Students are most active in green school environments. Students can enjoy studying in the garden. Teachers cannot face problems studying in a green school environment. Teachers and students benefit from studying in a green school setting. Students are more active in their physical and mental well-being in a green school environment. Suggestion: Provide green spaces to all private schools in Karachi. Students are more effective, energetic, and comfortable in a green environment. Green areas decrease lung disease and provide a good, fresh environment.

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