

The Impact of Outdoor Environments on Children's Behaviour: Insights from the Primary Schools in Vijayawada, India

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Abstract

Children spend considerable time outdoors in schools, and their experiences may influence their behaviour. However, how they influence each other is not adequately known. In this context, this study aims to examine where and how children choose to use the outdoor environments of the schools.

This study employs Behavioural Mapping as a research technique within a case study as a method. Two schools were selected to understand the relationship between outdoor environments and children's play in Vijayawada, India. Both schools varied in their outdoor spatial characteristics. The outdoors of the school A has natural and physical elements. In contrast, school B was completely barren without any features. The behaviours of children in both outdoor settings were observed for over four weeks. Four prominent types of children's activities were noted.

The highest number of users of the school outdoors were from school A, where the ground had different settings that offered opportunities to play. Compared to the school A, only 35% of students in the school B used their outdoors.

The findings suggest that the characteristics of the school outdoors influence students' play activities. The study concludes that outdoor environments with natural and physical elements engage children with various activities that promote their developmental outcomes.

The findings have the potential to guide the designers, planners and architects to provide suitable spaces for primary school students to afford their play and activities.

Keywords: Schools outdoor environment, primary school, children, behaviour mapping, play

Introduction

The outdoor spaces in schools serve various functions and benefit the environment because they combine typical play features with natural aspects like gardens, forest areas, and green spaces. They also frequently include outdoor classrooms and other learning opportunities

for children (Bates, Bohnert & Gerstein, 2018). Children spend considerable time outdoors in schools, and their experiences influence their overall development (Joyce, Chundeli & Vijayalaxmi, 2022). According to research, children who spend time in green spaces have improved attention spans, cognitive abilities, behavioural skills, and physical health (Mårtensson *et al.*, 2009; Kelz, Evans & Röderer, 2015). School outdoor environments have been found to foster positive social relationships and self-discipline in children (McCormick, 2017).

This study aims to understand children's activities concerning their outdoor environments. It addresses the question: Do the outdoor environmental characteristics of schools impact children's play activities?. The term "outdoor environment" in this study refers to the area immediately outside the school building, i.e., the open space on the school grounds.

Review of Literature

Literature on outdoor environments of schools has demonstrated the range of children's interactions with the outdoors and their forms of activities. (Dyment, 2005; Jansson, Abdulah & Eriksson, 2018). Interactions with green spaces have improved children's capacity to concentrate in various ways (Li and Sullivan, 2015; Amicone *et al.*, 2018). Children are more likely to engage with natural environments when they can acquire hands-on experience and manage vegetation (Jansson and Mårtensson, 2012). Children from low-income families growing up in those relatively poor urban neighbourhoods are significantly impacted (Bates, Bohnert & Gerstein, 2018). The effectiveness of fostering positive attitudes toward natural habitats and their inhabitants and teaching ecological principles to students in schoolyards has demonstrated that primary school students learn more effectively outside than in typical classrooms. Schools with outdoor areas benefit students, teachers, and the community. Studies also demonstrate that children who engage in outdoor learning have better critical and creative thinking skills (Cronin-Jones, 2010).

Chawla *et al.* (2014) point out that children can reduce stress, develop coping mechanisms, and create supportive social networks by participating in immersive activities in school grounds. According to Baranowski *et al.* (1993), three and four-year olds were consistently more active outdoors than indoors, and the environment appeared to be the biggest predictor of physical activity in young children (Baranowski *et al.*, 1993). The outdoor space environment school's is viewed as a social and pedagogical setting that emphasize learning. Outdoor activities at school promote student involvement. Additionally, they support physical activity to advance health and wellbeing (Larsson, Rönnlund and Larsson, 2020). According to research by Söderström *et al.* (2013), high-quality outdoor environments are linked to a number of positive health outcomes, such as increased happiness in children (Söderström *et al.*, 2013).

Green Vs Barren Outdoor Environments for Children

Children are more likely to engage in vigorous outdoor activities in green spaces such as gardens, parks, grasslands, and farms (Kjønniksen, Wium and Fjørtoft, 2022). According to recent research, having access to adequate facilities and space is significant for engaging in high levels of physical exercise (Morton *et al.*, 2016). Green outdoors attract children's attention and facilitate various play options (Dyment and Bell, 2007). Analyses found that children engage in various physical activities on the green school grounds and have significant declines in sedentary behaviour over time. Many children interact socially with their friends in the green schoolyards (Bates, Bohnert & Gerstein, 2018). Designed outdoor spaces at schools are more frequently used than barren ones (Brink *et al.*, 2010). According to a study by Andersen *et al.*, children engage in more physical activity in green spaces and playground areas than in devoid locations (Andersen *et al.*, 2015).

According to Samborski, the green school grounds offered significantly more opportunities for play and exploration than the barren school grounds (Samborski, 2010). The children using green outdoors preferred natural elements in their outdoors, compared to the children in the barren school. Barren, featureless school grounds offer children nothing with

which to interact, limiting their opportunities and therefore affecting their behaviours. Large stretches of landscapes devoid of natural features were also negatively associated with students' test scores (Matsuoka, 2010). Barren school grounds discourage children from diverse play, social interaction, ecological experience, and learning. In conclusion, it has been proven by numerous kinds of research that green spaces encourage increased use and may support favourable results for physical activity. In addition to decreased levels of stress, rage, and problem behaviours, students in schools with green outdoors also exhibit prosocial behaviours (such as forming friendly groups) (Chawla *et al.*, 2014). According to a study, children who had more access to green spaces during the school day were less stressed than their peers who had less access to green spaces (Corraliza, Collado and Bethelmy, 2012). Playing in green outdoor settings enhances students' attention (Mårtensson *et al.*, 2009). Exposure to green spaces promotes physical and mental health (Bikomeye, Balza and Beyer, 2021). The presence of natural elements in the school outdoors stimulates physical activity (Bell and Dymont, 2008; Kaymaz and Oguz, 2019; Raney, Hendry and Yee, 2019), provides opportunities for imaginative play (Samborski, 2010; Austin, 2021), constructive play (Boulton and Thomas, 2022), socio-dramatic play (Mårtensson *et al.*, 2014).

Research Methodology

Behavioural mapping

A unique observational technique called behaviour mapping has been used to answer this question. Behaviour mapping is an ecological approach to watching people without intrusion so that their behavior is not affected (Barker, 1965; Bozkurt and Woolley, 2020). It is an adaptable strategy for conducting observational research to examine relationships between the built environment and human behaviour. This technique has been used to record children's behaviour in social and environmental surroundings (Cosco, Moore & Islam, 2010). Behaviour mapping enables a researcher to observe the event firsthand. It has long been a popular method for non-participant compliance (Moore & Cosco, 2010). The study of children's behaviour outdoors and in Nature can be efficiently observed using behaviour mapping, a promising but under-utilized research tool (Ng, 2016; Adina, Loebach & Little, 2018). This approach depends on in-depth behavioural observations in conjunction with a map of the geographic space in which the behaviours are recorded. Afterwards they are analysed, and displayed because observation is one of the most significant ways to learn when and how people utilize a space (Acar *et al.*, 2021). Ng (2016) notes that this approach was frequently used with young children, the elderly, and people with cognitive impairment who have trouble verbalizing their thoughts, feelings and behaviours.

The Method

The study sample consisted of 423 students from two primary schools in Vijayawada, India. This included 209 (99 Girls and 110 boys) students from school A and 214 (105 Girls and 109 boys) students from school B who were between the ages of 6-11 years. The study makes use of the direct observation method: an effective, useful tool for evaluating outdoor spaces in terms of children's preferences. The outdoor environments in both schools were similar in the built-up area, accessible outdoor areas and enrollment. However, they varied in their outdoor features and spatial settings. School A was surrounded by natural elements like trees, green spaces and physical aspects like fixed play equipment, whereas school B was completely barren without any features. Fig.1 shows the spatial setting of the outdoor environments in both schools. The students were observed during their recess times. Recess is a break period in the school day that allows children to engage in active free play (Barros, Silver & Stein, 2009).



Fig. 1: Spatial setting of the outdoor environment School (A) with Physical and natural elements; School (B) with the barren ground

Source: Author

Table 1: Descriptions of the schools studied

Source: Author

CASE STUDY	SCHOOL A	SCHOOL B
Total area	1355 sqm	1300 sqm
Built-up area	270 sqm	293 sqm
Accessible outdoor area	870 sqm	840 sqm
Outdoor spaces	Green and Natural elements	Barren outdoor

Procedure

The study was conducted between November and December 2021. The current primary schools are comprised of five grades with one class per grade and students aged between 5 and 11 years. The day at the school commences at 9:00 am and ends at 3:30 pm, and there are three break periods with a total duration of 75 min (15 minutes morning, 45 minutes for lunch and 15 minutes post-lunch). During the break time, students use their outdoor school spaces for various activities. Observing the children and their behaviours were included in the behavioural maps. Firstly, a base map was made, which is a scaled representation of the physical layout of both schools. In this each region with activities were identified. The setting that influenced the behaviour of the students was noted. Then a coding scheme was created for behavioural groups.

The research problem at hand has identified behavioural categories that were pertinent. Thirdly, an observation schedule was created. In this case, it was time contingent following the school's break time. The mapping occurred at all possible times when the outdoor areas were used. Lastly, a procedure was created where observations were noted on data sheets with the date, time, and place of observation and the number and variety of users participating in each category. These observations, as shown in Fig. 2 and 3 were photographed and videotaped. Two researchers were involved in the entire process of observation which happened for a duration of four weeks: two weeks in each school.



Fig. 2: Play activities observed in school A
Source: Author



Fig. 3: Play activities observed in school B
Source: Author

Findings

Activities Observed

Physical play activities: It was observed that children were often playing on fixed equipment like monkey bars, slides and swings; participating in structured games; using equipment like shuttle rackets, bats, balls, and skipping ropes.

Cognitive play activities: These consisted of imaginative and creative play, which involves creating things out of nothing, interacting with Nature, exploring the environment, and taking part in innovative activities (role plays, creativity, drama, and fantasy).

Social play activities: These included talking with others, having small group gatherings, and chit-chats with each other.

Passive activities: Children sitting quietly, wandering.

Fig 4. shows the site plan of the school A with various activities coded in different types of behaviour settings. Six behaviour settings were observed in the outdoor environment of school A. They were green open spaces, pathways, play areas with equipment, boundaries of the school, shaded green spaces and sandpits.

In school A, the activities were as follows.

Cognitive activities (50%),

Physical activities (40%),

Social activities (5%) and

Passive activities (5%).

Fig. 5 shows the children's activities in percentages.

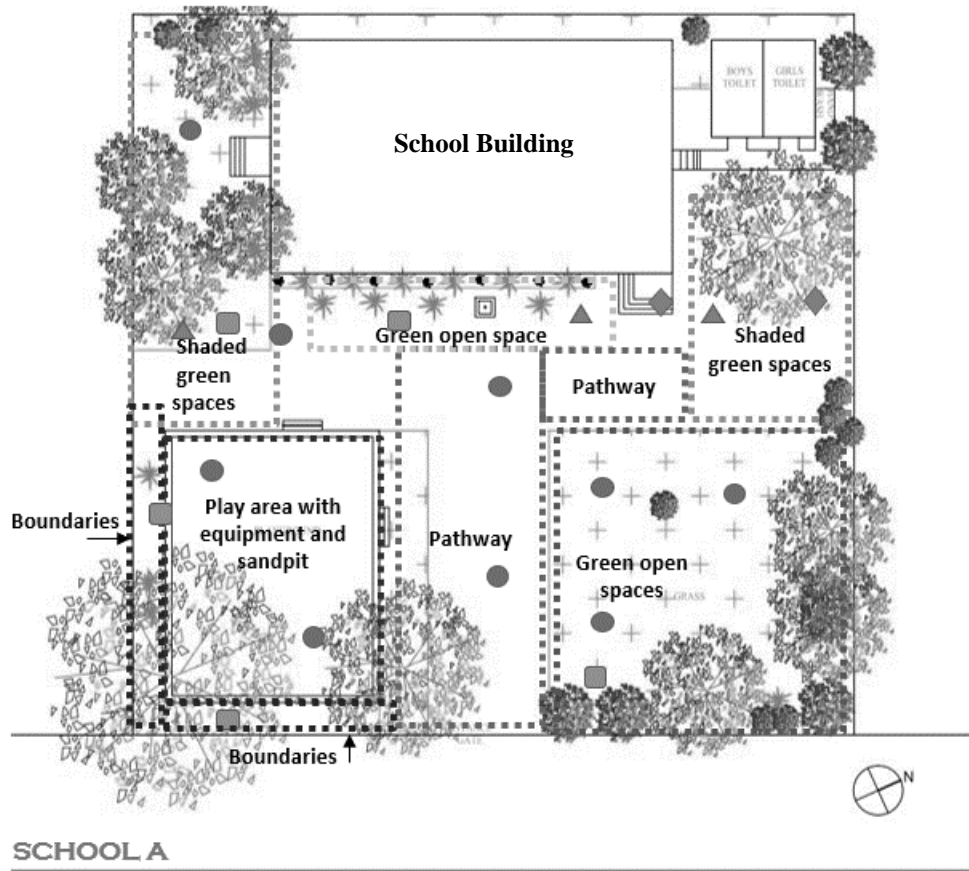
In school A, the cognitive activities primarily happened in green open spaces, school boundaries, shaded green spaces and sandpits. The physical activities took place in the pathways, play areas with equipment and shaded green spaces. The social and passive activities took place in the shaded green spaces.

Observations from school B indicated that the grounds were used only for physical activities. Fig 6. shows the site plan of the school B with activities coded in its outdoor setting. In school B, only two activities were observed and recorded.

Physical activities (30%) and

Passive activities (5%).

Physical activities occurred at the center of the ground and the school boundaries. Semi-open corridors accommodated physical and passive activities. Fig. 7 shows the children's activities in percentages. Students' choices of activities in school A consisted of cognitive, physical, social and passive activities, whereas students from the school B were involved primarily in the physical activities.



- Activities Coded**
- Physical activity
 - ▲ Social activity
 - Cognitive activity
 - ◆ passive activity

Fig. 4: Site plan of school A with activities coded in the outdoor settings
Source: Author

Table 2. Shows the different activities in different settings of school A
Source: Author

Outdoor features	Behaviour Setting	Students' activities observed	Percentage
Green open spaces	Cognitive activity	Ring catches, learning, pretend plays	20%
Pathways	Physical activity	Physical play, skipping	10%
Play area with equipment	Physical activity	Playing with the types of equipment like slides, swings, see-saws, climbers	20%
School Boundaries	Cognitive activity	Imaginary play with natural materials like stones, mud, bricks, leaves	10%
Shaded green spaces	Cognitive activity	Constructive play	10%
	physical activity	playing organised games	10%
	Passive activity	Sitting, observing others.	5%
	social activity	Having lunch	5%
Sandpits	Cognitive activity	Constructing castles, imaginative play	10%

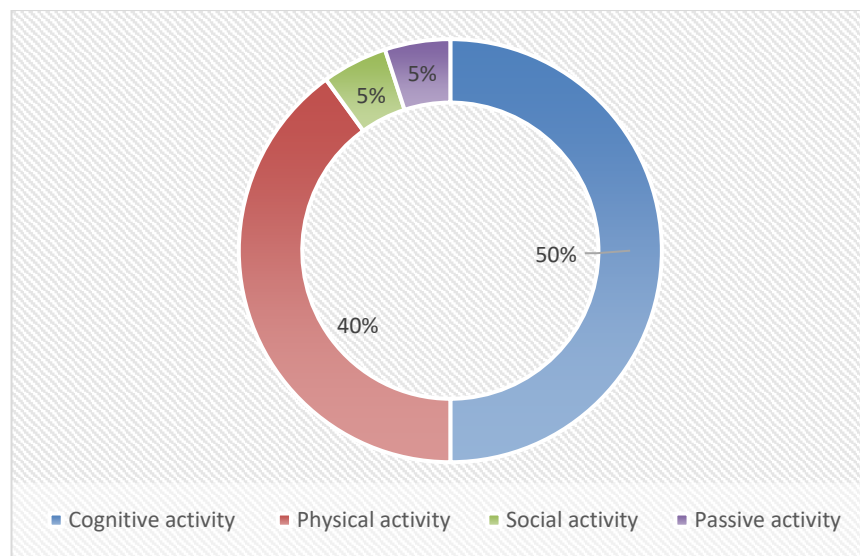


Fig. 5: Proportion of children's activities from school A
Source: Author

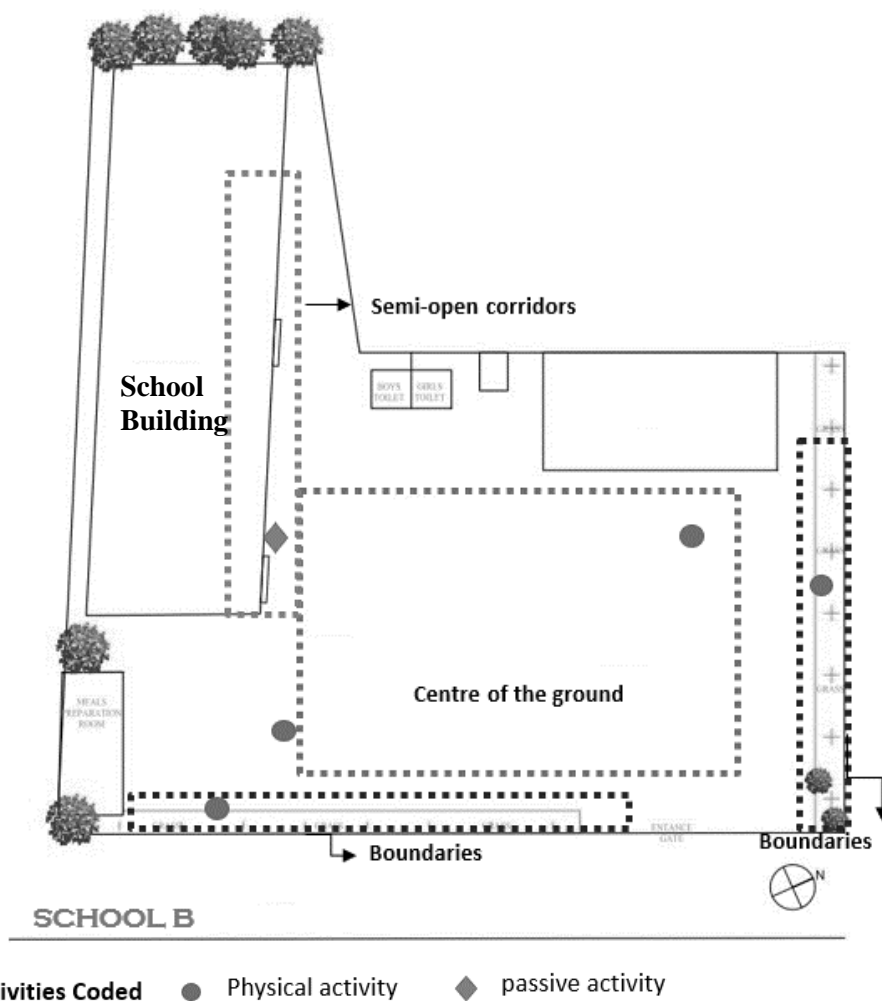


Fig. 6: Site plan of school B with activities coded in the outdoor settings
Source: Author

Table 3. Different activities in different settings of school B
Source: Author

Outdoor features	Behaviour Setting	Students' activities observed	percentage
Barren ground	Physical activity	Chasing games, hopping	10%
		Running around the school ground	5%
		Playing traditional Indian sports like kho-kho and kabaddi.	5%
School Boundaries	Physical activity	Chasing games	5%
Semi-open corridors	Physical activity	Running	5%
	Passive activity	Sitting and watching friends	5%

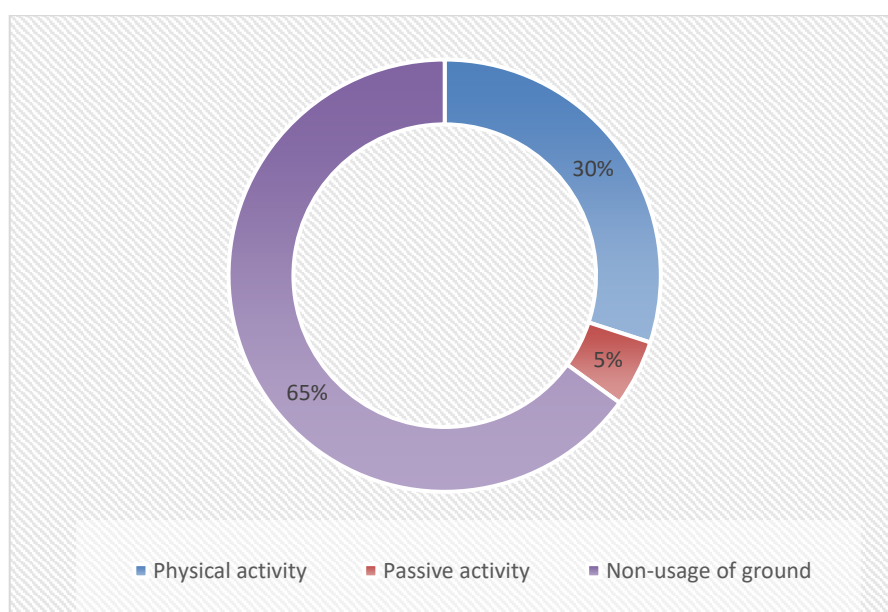


Fig. 7: Proportion of Children's activities from school B

Discussion

Researchers employ behavioural mapping to link different observed behaviours to specific places (where an activity occurs), environmental elements of the physical environment (which features are used), types of users (like children), and over time (e.g., in a week). Although outdoor environments significantly impact human health, cognitive development and social wellness, these effects have not received much attention, especially in primary schools.

In this research, it was observed that compared to school B, which was deprived of activities, school A could promote and support various activities. Exposure to green spaces is crucial for childhood cognitive development (de Keijzer *et al.*, 2016). Schools' green and natural outdoor activities impact student achievements by lowering the students' stress.

Moreover, natural elements stimulate physical activities (Aminpour, 2021). Since children spend a lot of time at school, the outdoor environment of a school has a great deal of potential to affect them. The types of natural features in play spaces can also significantly impact how children interact with one another (Malone & Tranter, 2003). As a method of information gathering rather than a technology, behaviour mapping is sensitive to capturing differences in activity intensity between various situations.

These results align with previous research on the contribution of green space and multi-purpose school grounds to stimulating activities. In line with the earlier research by Brink *et al.* (2010), schools with green outdoor environments were more utilized than barren ones. In the present study, students at school A had higher overall levels of activities than the school B. In school A, 100 per cent of the total enrollment used the school outdoors for various activities, whereas only 35 per cent of the students used their grounds in the school B. This large difference is because of the variation in their outdoor settings; one is green, full of natural and physical elements and the other is barren.

There is evidence that green schoolyards may benefit a child's development, including physical activities and pro-social relationships. This study also noted that as many as 65% of children on a barren playground are passive. For the most part, girls at school B voiced extreme dissatisfaction with their school grounds. They, in their perspective, were dull and unattractive and lacked any areas for students to sit or engage in activities. Thus, they frequently stayed inside the classrooms. Additionally, this study clearly showed that access to these outdoor features encouraged physical, cognitive, and social activities of the students and significantly impacted the types and diversity of play in the outdoor environments of schools. A

comprehensive overview of the greenery seems extremely attractive for the students in school A, whereas the openness and the barren nature of the grounds exposed the children to the scrutiny of supervisors.

Conclusions

This study used behaviour mapping, a promising technique for quantifying this relationship objectively, to emphasize the relationship between the characteristics of the school's outdoor environments and the students' play activities in two different spatial settings. The results support the importance of outdoors of schools and the activities in their environment, which is essential for formulating policies and implementing appropriate instructional practices. Play, a critical aspect in a child's life, impacts them in various parts of their development. Research has proven links between the outdoor environments of schools and children's outcomes (Joyce, Chundeli & Vijayalaxmi, 2022).

This study also aligns with the previously conducted studies that the outdoor characteristics impact students' behaviour. School A engaged students in various types of play activities which in turn affected their development, whereas school B had fewer options. Therefore, it becomes essential to design schools outdoors with natural and physical elements. This finding indicates that policymakers, practitioners and architects should initiate actions for school outdoor environments to make them more engaging for the children. The conclusions from this study could also be a useful source for instructional materials designed to aid in the ongoing professional development of educators and decision-makers.

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