Affordances of School Grounds for Children’s Outdoor Play and Environmental Learning

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Introduction

- The quality of life and of the environment can never be improved without an understanding of the person-environment relationship.

- There is a need to understand children’s perceptions about their environment as perceptions are a good predictor of people’s behaviour in some contexts (Ball et al., 2008) when the psychology behind their behaviour remains unexplained by the objective measure approach (Ward Thompson, 2013).

- An understanding of children’s perceptions will lead to an understanding of their emotions, needs, preferences and interactions.

- It is an essential part of the process of creating a child-friendly environment that will offer more meaningful experiences for children through an encouraging engagement and interaction with the environment.
Schools grounds as potential sites for children’s outdoor play and environmental learning

- School grounds provides the opportunities for children to interact with the school environment through movement, investigation, concentration and social interaction.
  - Promotes children’s physical, social and cognitive development and children’s health (Ozdemir and Yilmaz, 2008; Willenberg et al., 2010)
  - Potential sites for place-based or environmental learning and instruction (Malone and Tranter, 2003a, 2003b; Dyment, 2005; Dyment et al., 2009; Powell, 2007; Stanley 2010)

- Children’s outdoor play in the school grounds is a fundamental component of informal learning, which has been referred to as environmental learning by Tranter and Malone (2004).
Research Problems

PROBLEMS

1. SG DESIGN
   • Adults often overlook the values of outdoor play and informal learning that lies outside the classroom
   • Conventional school grounds
   • Limited spaces and landscape features for children’s play
   • Children’s views in planning and design are generally ignored

2. SG CULTURE
   • The regulations restrict children from playing at certain times and places
   • The creative, widespread use of school grounds for outdoor play were viewed as hazardous and irrelevant

Design

- Courtyard (paved area)
- Field

Culture

- Restrictions and the issues of accessibility
There has been a variety of research about school grounds, but most studies have focused either on the impacts of the physical environment on children’s behaviour and levels of physical activity or on children’s perception of their school grounds environment.

- The studies overlooked the connection between the physical environment and the social context of school grounds regarding the actualisation of affordances and the formation of children’s preferences.
- Research focusing on children’s values of outdoor play for environmental learning in relation to the physical and social contexts of school grounds is less studied.

Therefore, more comprehensive research is required to explore the connection between children’s experiences within the designed school grounds environment with their perceptions of the ideal school grounds for environmental learning.
Research Aim

To identify the **influential factors affecting the actualisation of affordances and children’s preferences** regarding the use of school grounds for outdoor play and environmental learning.
Research Objectives

1. To explore the affordances of the school grounds from the children’s perspective
2. To identify the factors that influence the level of actualised affordances in the school grounds
3. To explore the perceptions of children and teachers on the use of school grounds for environmental learning
4. To distinguish the meaning of ideal school grounds that permit environmental learning
RESEARCH ASSUMPTION:
As school is being included in the ‘institutional triangle’ of children’s daily live, it signifies the important roles of school grounds for children’s outdoor play and environmental learning in outdoor environments. The physical and social contexts of school grounds may significantly influence the opportunities for children to engage in outdoor play and gain environmental learning.

<table>
<thead>
<tr>
<th>KEY RESEARCH QUESTION</th>
<th>RESEARCH QUESTION</th>
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</thead>
<tbody>
<tr>
<td>Why are the appropriate physical and social contexts of school grounds important in promoting outdoor play and environmental learning among children?</td>
<td><strong>PART 1: Environment-behaviour responses</strong></td>
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<tr>
<td></td>
<td>1. How are the school grounds being used by the children for outdoor play during non-formal and informal learning?</td>
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<td></td>
<td>2. What are the differences in children’s play behaviour patterns during the sessions? Why?</td>
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<td>3. What are the properties and attributes of school grounds that influence children’s play behaviour patterns?</td>
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<td><strong>PART 2: Perceptual responses</strong></td>
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<td>4. What are the potential and barriers of school grounds for environmental learning?</td>
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<td>5. What are the children’s and teachers’ preferences and needs for ideal school grounds?</td>
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</table>
Research Underpinnings

**Person-environment fit**
- Muchinsky and Monahan, 1987
- Caplan and Harrisson, 1993; Kristof, 1996
- Edwards et al., 1998
- Ozdemir and Yilmaz, 2008; Eccles et al., 1991; Stokols, 1979
- Bonnes and Secciaroli, 1995; Haikkola et al., 2007
- Kyttä, 2003

**Environmental Affordances**
- Gibson, 1979; Heft, 1988, 2010; Reed, 1996
- Powel, 2007; Kernan 2010; Storli and Hagen, 2010; Laaksoharju et al., 2012

**Environmental Preferences**
- Eubanks Owens, 1994; Malinowski and Thurbert, 1996; Korpela et al., 2002; Hartig and Staats, 2005; Matsuoka and Kaplan, 2008
# Variables of the Study

<table>
<thead>
<tr>
<th>DIMENSION</th>
<th>VARIABLES</th>
<th>ITEMS</th>
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</thead>
<tbody>
<tr>
<td>1. Properties and attributes of school grounds (ENVIRONMENT)</td>
<td>a) Physical environmental properties</td>
<td>• Features – natural and man-made features</td>
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<td></td>
<td>b) Physical environmental attributes</td>
<td>• Design – spaces, size, space connectivity</td>
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<tr>
<td></td>
<td>c) Social/cultural properties and attributes</td>
<td>• Availability, functionality, adequacy, aesthetic quality, safety</td>
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<td></td>
<td>d) Accessibility</td>
<td>• Policies, regulations, social dynamics</td>
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<td></td>
<td>e) Opportunities for outdoor play</td>
<td>• Physical – location, easily access</td>
</tr>
<tr>
<td></td>
<td>f) Actualisation of affordances</td>
<td>• Socially – permitted/restricted</td>
</tr>
<tr>
<td>2. Behavioural responses (ACTION)</td>
<td>g) Place preferences</td>
<td>• Use, activities, types of play, play behaviour pattern, social interaction, performance</td>
</tr>
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<td></td>
<td>h) Perception of environmental learning</td>
<td>• Place affordances, level and taxonomy of affordances, fields of free, promoted and constrained action</td>
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<tr>
<td></td>
<td>i) Conception of ideal school grounds</td>
<td>• Favourite and disliked places in school grounds</td>
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<td></td>
<td>j) Emotional effects</td>
<td>• Potentials and barriers of environmental learning in school grounds</td>
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<tr>
<td></td>
<td></td>
<td>• Needs – Communal, physical, emotional and educational needs</td>
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<td></td>
<td></td>
<td>• Preferences – Features and design patterns</td>
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<td></td>
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<td>• Positive and negative feelings from interaction with school grounds environment</td>
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</tbody>
</table>
Interrelationship between Variables

PLANNING AND DESIGN OF SCHOOL GROUNDS

UP

D1
School Grounds Environment

D2
Children’s Outdoor Play

D3
Preferences

Actalisation of Affordances

offered affordances

perceived affordances

offered affordances

Conception of ideal school grounds

Perception and attitude towards

Children’s interactions

Children’s emotions

Children’s needs

BOTTOM

CHILDREN’S BEHAVIOURAL AND PERCEPTUAL RESPONSES

Environmental Learning
The Study Sites

SELECTION CRITERIA:

- The school is a national school of the MOE;
- The school has been recognised as a Sustainable School – An Environment Award through participation in the programme for the session 2009/2010;
- The selected schools should represent different localities of school – an urban school and a rural school; and
- The area of each school is between 2.5 to 5 acres (approximately 10,000-21,000 square meters).

<table>
<thead>
<tr>
<th>Zoning</th>
<th>1. Urban school</th>
<th>2. Rural school</th>
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<tbody>
<tr>
<td></td>
<td>Area (m²)</td>
<td>%</td>
</tr>
<tr>
<td>Enclosed space</td>
<td>1578</td>
<td>9</td>
</tr>
<tr>
<td>Semi-enclosed space</td>
<td>859</td>
<td>5</td>
</tr>
<tr>
<td>Green area</td>
<td>10606</td>
<td>58</td>
</tr>
<tr>
<td>Asphalt area</td>
<td>1895</td>
<td>10</td>
</tr>
<tr>
<td>Paved area</td>
<td>1453</td>
<td>8</td>
</tr>
<tr>
<td>Walkway/corridor</td>
<td>1426</td>
<td>8</td>
</tr>
<tr>
<td>Drain/others</td>
<td>548</td>
<td>3</td>
</tr>
<tr>
<td>TOTAL AREA</td>
<td>18365</td>
<td>100</td>
</tr>
</tbody>
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Research Methodology

Research Design

Exploratory research

Transactional approach in a phenomenology study

Mixed methods design (Concurrent nested strategy)

Qualitative (Predominant method)
- Children (Stratified purposeful sampling)

Quantitative (Embedded method)
- Teachers (Simple random sampling)

Data analysis and triangulation

Findings

Measurement Strategies

<table>
<thead>
<tr>
<th>STRATEGY</th>
<th>RESPONDENT</th>
<th>OBJECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) Walkabout interview and mapping</td>
<td>Children (n=80)</td>
<td>RO#1</td>
</tr>
<tr>
<td>b) Photography and discussion</td>
<td></td>
<td>RO#2</td>
</tr>
<tr>
<td>c) Drawing</td>
<td>Teachers (n=71)</td>
<td>RO#3, RO#4</td>
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<tr>
<td>d) Preference survey</td>
<td></td>
<td>RO#3</td>
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<tr>
<td>e) Survey questionnaire</td>
<td></td>
<td>RO#4</td>
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</tbody>
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Research Objectives

**RO #1**
Affordances of school grounds
- Outdoor play activities
  - The use of school grounds environment
  - Play behaviour patterns & children's performances
- Children's walkabout interview & mapping (n=80)

**RO #2**
Factors that influence level of affordances
- Place preferences
  - Children's affection & evaluation towards the environment
  - Properties & attributes of school grounds
- Children's photography & discussion (n=80)

**RO #3**
Environmental learning in school grounds
- Perceptions & attitudes
  - The potentials & barriers of school grounds for environmental learning
  - Beliefs, preferences & needs
- Children's preference survey (n=80)

**RO #4**
Ideal school grounds for environmental learning
- Needs & preferences
  - Meaning and understanding on the potential affordances of school grounds
  - Features, design patterns & aspects considered
- Teacher's survey questionnaire (n=71)

**TRIANGULATION**

- Person-environment relationship ("ACTUAL" environment)
- Physical & social factors
- Perceptual & conception ("IDEAL" environment)

**Theoretical & design implication in enhancing school grounds' potentials**
## Research Findings

<table>
<thead>
<tr>
<th>OBJECTIVE</th>
<th>VARIABLES/ ITEMS</th>
<th>RESULTS AND FINDINGS</th>
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<tbody>
<tr>
<td><strong>RO #1</strong></td>
<td></td>
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<tr>
<td>1. Opportunities for outdoor play</td>
<td>The SG offered more play opportunities for the children during the Informal Learning (IL) than the Non-formal Learning (NL) sessions.</td>
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<tr>
<td>2. Play behaviour patterns</td>
<td>Different play behaviour patterns during NL (prescribed play and organized play) and IL (unstructured activities, imaginative, creative and active-free play).</td>
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</tr>
</tbody>
</table>
| 3. Actualisation of affordances | **Place affordances:** The opposing trends during NL (school field) and IL (semi-enclosed space) at both schools.  

**Taxonomy of affordances:** The school grounds offered more MM features for children to engage with, suggests that the SG have barren landscapes.  

- **Categories for NA features:** Graspable objects, Flat surfaces, Sociality.  
- **Categories for MM features:** Graspable objects, Attached objects, Flat surfaces.  

**Level of affordances:** The MM features offered more affordances for children to utilise and shape the features. |

| **RO #2** |                  |                      |
| 1. Spatial patterns of place preferences | Different **hotspots areas for favourite and disliked places** & similar trends at both schools:  

- **Favourite places:** Concentrated at certain places (Green areas).  
- **Disliked places:** Scattered among many places (Green areas, Paved areas, Semi-enclosed spaces). |
| 2. Factors that influence children’s place preferences | Children’s responses were categorised into 19 categories, then sorted into **6 main themes (environmental characteristics):**  

- **Functionality, Accessibility, Attractiveness, Aesthetic quality, Comfortability and Safety**  

Different environmental characteristics for different place preferences:  

- **Favourite places:** Functionality, Attractiveness, Aesthetic quality, Comfortability  
- **Disliked places:** Safety, Aesthetic quality, Comfortability, Accessibility |
## Research Findings

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<td><strong>RO #3</strong></td>
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</table>
| 1. Children’s perception on learning in SG | Majority of the children preferred to learn in SG  
  • **Positive perception**: Contact with nature, affection, comfortable, play, change learning routine, see others, better concentration and understanding.  
  • **Negative perception**: Microclimate, boring, noisy, safety, inadequate facilities, less concentration. | |
| 2. Teachers’ perception on the use of SG for PLBD | Majority of the teachers gave positive responses  
  • **Potentials**: Afford EE, diversify and enhance P&P activities, long-life leisure, develop skills and attitude, hands-on experiences.  
  • **Barriers**: Safety, limited spaces, resources, budgets and time, weather and environmental conditions. | |
| **RO #4** |                  |                      |
| 1. Children’s perception on ideal SG | 12 **categories of Environmental features** were categories into 4 main categories:  
  • MM (Attached and graspable objects, facilities, vehicles); **NA** (Animals, vegetation, topography, water features, surface features); **SO** (People, activity); **CL** (climate).  
  19 relevant **Design patterns** were identified from children’s drawings:  
  • The most drawn: Green area, reference, animal life, quite area, play area, field, orchard, context of SG, private space.  
  • The least drawn: Learning zone, canteen, sporting court, pathway, campus plan, promenade, technology, grassy area, hard surface area, entrance area. | |
| 2. Teachers’ perception on ideal SG | 6 relevant **Design Patterns**:  
  • Learning zone, green area, display space, play area, animal life, quiet area.  
  **Aspects considered for SG environment**:  
  • **Environmental aspects**: Attractiveness, Comfortability, Aesthetic quality, Safety.  
  • **Other aspects**: Maintenance work, support from school, PLBD in curriculum, training for teachers, budget, resources for teaching, time management. | |