Affordances of Sensory Garden towards Learning and Self Development of Special Schooled Children

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Abstract

This study examined the design and use of a sensory garden, located in a special school in the United Kingdom, by evaluating their zones and how they are utilized, with a focus on children with special needs, and their adult carers. The potential for users' physical engagement with the attributes, whether the physical activity was accessible or if opportunities are not being actualized because of barriers were looked into. Interviews, observation and behaviour mapping methods were applied in conjunction with affordance theory. The study was supported with a few noteworthy events recorded as anecdotal evidence to illustrate on the users' experience in a sensory learning environment. The researcher had discovered that the layout of pathways and pathway connectivity have a significant influence on how users engage with the attributes in the sensory garden. This main finding should assist to inform the theory and practice of designers when they create future sensory gardens in special schools.

Keywords: Affordances, Behaviour, Sensory garden, Sensory stimulation, Educational development, Social interaction

1. Introduction

Although gardens as a therapeutic environment has long been recognized, little empirical study evaluating how gardens support the users' well-being has been gathered (Cooper Marcus, 2002; Shoemaker, 2002, Whitehouse, et al., 2001) Added to that, the researcher had discovered the lack of rigorous research on sensory gardens (Hussein, 2009a). In an interview that the researcher carried out with Jane Stoneham (2006), the director of the Sensory Trust (http:www.sensorytrust.org.uk) and the author of the book, "Landscape Design for Elderly and Disabled People", Stoneham stated that a considerable amount of research needed to be conducted in the area of sensory impairment, mainly with regards to discovering what children with special needs really required. She warned that a great number of assumptions have been made about how disabled people navigate and benefit from an outdoor environment but this had not yet been fully tested. Stoneham also mentioned that there is evident in the fact that an ambiguous direction has been taken in relation to sensory gardens and that there are no design guidelines although there are many publications on multi-sensory environments, for example, Snoezelen (Long and Haigh, 1992; Cavet and Mount, 1995) and anthropometrics (Harris and Dines, 2005). Hence, the design of sensory gardens relies on the experience and attitude of designers. This idea is supported Petrow of Robert Petrow Chartered Landscape Architect (2006), Mathias of The Hidden Garden (2006), Robinson of Stockport Metropolitan Borough Council (2007) and Boothroyd of Groundwork Wirral (2007), who note that there is a lack of detailed guidelines available when designing sensory gardens for children with special needs.

Despite this scarcity, there are a few of close-related works on other variety of outdoor environments, namely hospital garden (Whitehouse, et al., 2001; Said et al., 2005) and inclusive parks (Moore and Cosco, 2007). These works, which have some insights on the impact of a garden on the users' well-being and behaviour, were also relevant to this study in terms of their theoretical framework, methods and findings. The study of sensory gardens demands research in both the environment and behaviour because such garden must be designed,

maintained and managed to fulfil the users' needs. In order to meet those needs, landscape architects should understand how these users behave, use and engage with the attributes in the sensory garden (Hussein, 2009b). During the preliminary site studies, the researcher had discovered that there are many precedents set for sensory environments but none of them are designed to fulfil the users' needs (Hussein, 2009c). Thus, environment and behaviour research that include systematic investigation of the relationships between the environment and human behaviour, and their implication in the design of sensory gardens, is needed.

2. Literature Review

One of the requirements outlined in Building Bulletin 102 (2008) when designing a special school for children with special educational needs is to provide an accessible outdoor environment, which emphasizes multi-sensory experiences for therapy, educational and recreational use through play. Striniste and Moore (1989) signified 'play' as a physical contact between a child with surrounding features and social interaction with peers. Play also means movement (Hart, 1979; Moore, 1986) or mobility (Kytta, 2003). In terms of the play quality, Wolff (1979) stated it as to allow opportunities for physical activity as well as emotional and social interactions (Moore and Wong, 1997). The National Children's Bureau (1992) and Lansdown (1996) concurred that the quality of play is a process of manipulating the environmental features, allowing a child to experience the environment that is safe, creative, stimulating, adventurous and spontaneous, at the same time affords a child for play opportunities. Play is clearly a significant (Moore, 1986; Titman, 1994) and is an essential requirement for their learning, well-being and self development (Lansdown, 1996).

Mount and Cavet (1995) and Chawla and Heft (2002) mentioned the richness of the visual, auditory and tactile stimuli in gardens and opportunities they could offer for exploration could assist users to develop an understanding of the environment. However, any impairment, disability or handicap will limit a person's ability to engage with the environment. McLinden and McCall (2002:54) differentiated between the close senses (touch and taste), and the distance senses (sight, smell and hearing). They further noted that '*when the distance sense of vision is impaired, young children may be able to compensate to some extent by making greater use of their other distance sense – hearing'*. For example, during one of the observation days at the case-study site, the researcher observed a partially sighted child heard the sound stimulation feature when it was making a noise by itself*: A young boy was walking hand in hand with his teacher in the sensory garden. He was wearing glasses and looked very charming. Both of them were silent – listening to the humming insects, chirping birds and the wind in the leaves. As they were strolling together, one of the sound stimuli went off by itself. The boy let go of his assistant's hand and ran towards the sound. Soon he managed to find the source of the sound.*

Having a play ground (Titman, 1994) or a sensory garden (Westley, 2003) in a school ground is important for children to offer them the opportunity to play, explore and learn as well as providing them a space for privacy (Moore, 1986). Titman (1994:58) identified four elements in school grounds: *a place for doing* (opportunities for physical activities); *a place for thinking* (opportunities for intellectual stimulation); *a place for feeling* (to provoke a sense of belonging); and *a place for being* (to allow them to be themselves). Her research focused on the importance of having school grounds as an educational resource to demonstrate how students' behaviours and learning skills could be enriched. One of the ways in achieving an environmental education is to have plant compositions that grow fast, able to provide shade and visual stimulation through the use of colours, textured and scented (Hussein, 2005d). These qualities of compositions must be taken into consideration so that they provide mystery, the ability to hide and to create space. Two examples of special school, which have built this kind of environment, are the Meldreth Manor School in Hertfordshire (Frank, 1996; Stoneham, 1996) and Hazelwood School in Glasgow (completed in 2007). The sensory gardens there were designed with a series of path network integrated and woven around the existing trees, while preserving them; it offers pupils a variety of sensory experiences.

Special schools that offer a sensory environment has proven to be beneficial for both teachers and pupils as it provides a two-way learning process (Hussein, 2010e). This idea matches Titman's (1994), Lucas's (1996), Stoneham's (1997), Moore's (1999), Woolley's (2003) and Maller and Townsends' (2005/2006) beliefs that outdoor environmental learning can influence children's behaviour and their development in terms of mental, health, emotional and social relationships as well as providing a stimulating experience, especially being in contact with animals and plants. This notion has received further support from Sandra Smith, an occupational therapist of the Royal School for the Deaf and Communication Disorders, Cheshire: '*So we are looking at meeting that sensory needs, the smell, the touch, the sound of the rustling leaf, the feel of water. I have seen the children are really enjoying that and those effects on your well-being. It makes you feel better. Just being outside in the sunshine. Being able to smell the plants, feel them, see them, can make you feel a whole lot better yourself.*

That can actually help with your condition. If you are feeling a bit low, if you are not feeling too well, it can lift up your mood completely and that is important from an occupational therapy point of view'. Therefore, sensory environments are used by all kinds of disabilities in special schools where this offers them the ability to engage in self-stimulating activities while enhancing learning opportunities outdoors.

3. Theoretical Framework: Perceiving Affordances in Children's Outdoor Environment

The theory of affordance was first coined by Gibson (1979) assists researchers to understand the influence of the built environment on children's active living and to recognize environmental attributes that are associated with specific behavioural responses (Cosco, 2006). As mentioned earlier in the previous section, children playing in an educational setting offer positive interactions between them. That is, playing involves perceptual learning and physical actions. During play, a child will "pick up", gather and process the information through direct perception while moving in the setting. The approach can be understood through three concepts: *affordance, information* and *pickup information* (Gibson and Pick, 2000).

Affordance is defined as the functionally significant properties of physical opportunities and dangers, which one perceives while acting in a specific setting (Gibson, 1979/1986; Gibson and Pick, 2000; Heft, 2001; Kytta, 2003). In other words, the environmental features as a property of the relationship between the environment and the users and the possibilities that a place can offer users, whether or not the designers intended those possibilities.

According to Gibson and Pick (2000), the environment offers information as ambient arrays of energy that is structured by surfaces, boundaries, events, objects and layout of the environment. The information perceived changes depending on the perceiver's movement (sitting, standing, walking, etc.) and their senses (sight, hearing, taste, touch and smell). These changes are essential for identifying, extracting and describing information about where one is, where one is going and what one is accomplishing. For example, users passing through the sensory garden often stop for a while to engage with the attributes that are adjacent to the pathway. Their engagement enables them to experience different views of the garden.

In the view of children movement in experiencing the environment, Gibson and Pick (2000) classified two types of information pickup: *exploratory* and *performatory*. *Exploratory* permits children to discover about the new properties of the environment and about their own capabilities. *Performatory* is the outcome of already affordances and related to actions directed towards objects or individual within a setting for an intended purpose, for example, throwing, hitting, etc. "Perception and action are closely intertwined in both exploration and performance, and learning is an important outcome of both types of action" (Gibson and Pick, 2000:21).

According to Kytta (2003), children's engagement with the environment can be divided into two levels of affordances: *actualized* and *potential*. Actualized affordances are what the children encountered during their independent mobility, perception and engagement with the environmental features (Heft, 1988, 1999; Kytta 2002, 2003, 2004, 2006). Potential affordances are different for each individual and each specific group of people, depending on how their physical a skills and bodily proportions, social needs and personal intentions are matched with the environmental features (Kytta, 2002, 2003, 2006). Heft (1989) suggests that potential affordances should be distinguished from actualized affordances. Kytta (2003:49) supported, '*potential affordances become qualities of the environment and the actualized affordances become individual relationships with the environment*'.

Kytta (2003) further noted that users perceive two types of affordances: *positive* and *negative*. Both of these types are determined by the quality of the environmental features that can be perceived through their senses. Positive affordances relate to the children's movements and their perceptions of the environment, resulting in them offering satisfaction, appealing and friendly. Negative affordances induce feelings of avoidance, danger, escape and fear (Heft, 1999; Kytta, 2003). However, according to Hart (1979) and Kytta (2003), children might also be interested in engaging with attributes that are unsafe as they like to take risks when they are active in their surroundings.

Play behaviour illustrated by children indicates they understand the functional properties (affordances) of the environment by experiential involvement through perception and movement. Thus, play should be recognized alongside education as a vital part of children's healthy and happy development. In this study, the concept of affordances is useful in describing the engagement between the users and the environment features, their responses as well as the possibilities that a sensory garden can offer users, whether or not designers intended those possibilities when designing for sensory garden.

4. Summaries of Case Studies

The researcher conducted field work in a sensory garden of the Lyndale School, a non-residential special school in Wirral. The school hours are from 9am until 3pm, Mondays to Fridays and it caters for children with complex needs, and profound and multiple disabilities from the ages of two to eleven years old. The inspiration for having a sensory garden came from the school's Deputy Head, Dave Jones, who dies in summer 2002. In January 2003, the planning and design work started and was completed in September 2005. A landscape architect from Ground Wirral, Mark Boothroyd, designed the sensory garden. It is situated between the school's building and the residential backyard. It has a linear form with a combination of flat and undulating topography (Note 1)

5. Methodology and Approach

In this study, interviews/walk-through interviews were conducted with the designer, teachers (n=6) and therapists (n=3). These were followed by a systematic series of observations and behaviour mapping. Due to the difficulties surrounding communication between the researcher and the students with special educational needs, particularly those with a speech, language and communication difficulties, these methods were thought to the most appropriate.

Data gathering was conducted in May and July, for seven days each month. This time of year has possibly the best outdoor conditions and the period of observation was chosen to try to ensure that the daily variations in behaviour could be observed. The data was then recorded continuously from 9am to 3pm on weekdays, during the opening hours of the school during the term, for thirteen separate thirty-minute periods, on different days, and at different times of the day. By reference to Golicnic's work (2005), it was decided to have four timescales (less than 1 minute, 1-2 minutes, 2-5 minutes and more than 5 minutes) to record the duration of each activity that the users undertook and affordances that took advantage. This is important in this study to measure how long they spent in the garden in their engagement with attributes of the garden.

In the Lyndale School, there was no timetable allocation set for the teachers, therapists and students to use the sensory garden. Students had their own individual timetable and they were free to use the garden as they wished, with the help of their adult carers. As a result, the researcher decided to record and to observe all users who utilized the sensory garden, in a specific observation period, as mentioned previously. The users were observed in terms of how the users, especially some particular students, behaved, how long they spent in the sensory garden and if they took advantage of affordances.

6. The Observation Analysis and Findings

Users' behaviour in the sensory garden was observed, recorded and listed under three affordances:

1) The level of affordances, i.e., actualized affordances. This signified the activities that were undertaken by the users in response to the attributes.
2) Unique affordances and multiple affordances. Unique affordances mean a single opportunity of activity engaged in by users, while multiple affordances mean two or more opportunities for the activities engaged in by users. This illustrated whether there was a single or further opportunities for activities in which the users could be engaged.
3) The types of affordances, i.e., positive and negative affordances. This differentiated the preferences and dislikes of the users in response to the attributes of the sensory garden.

These affordances that were tabulated to investigate the attributes with which users' engaged the most or least, to give the researcher an idea about how sensory gardens could be structured and how they could offer a richness of affordances in their zones (Note 2).

Analysis of the frequency of actualised affordances (unique and multiple affordances) showed that the *Woodland Garden* (zone D) had the greatest number of multiple affordances (n=114) but no unique affordances, with a total time spend of 167 minutes. This indicates that each user spent a median of 1 minute and 46 seconds in this zone. In this zone, partially-sighted students liked to touch, feel and hold the rope railing while walking on the boardwalk. Users also utilised the area to run about and listen to the sound stimuli. However, a few sound stimuli that had been installed at the end of the boardwalk created a "bottle neck" for movement of those students in wheelchairs. Thus, some of them chose not to engage with the sound stimuli (Note 3).

The second highest frequency of actualised affordances was in the *Green Space* (zone C), a total of 107, adding both types of affordances, with a total time spend of 198 minutes and 30 seconds. The greatest amount of time spent in this zone appears to have been as a result of users' enjoyment of the richness of attributes that were offered, such as the artwork display (Note 4), covered tunnel (Note 5), sloping lawn, musical pipes, the textured

wall and the raised beds with herbs and scented plants (Note 6). In this zone, each user spent a median of 2 minutes and 25 seconds. For example, in one speech therapy session, a group of staff and students threw water balloons at the textured wall. This fun activity affords communication. Other actualised affordances observed at the *Green Space,* included students who were physically able, enjoying climbing up (sometimes using the log as a means to push off and then climb up) and coasting down the sloping lawn. Users also liked to walk on the pathway while brushing their legs and hands against the lavender (Note 7). One potential affordance was recorded at the Green Space where students in wheelchairs could not reach up to touch and smell the herbs in the raised beds and often asked for staff assistance (Note 8).

The smallest zone, *Water Garden* (zone B) had 70 frequencies of actualised affordances. Users spent the least time (82 minutes) in this zone due to the technical failure of the water feature. Instead, they used other attributes such as, feeling the texture of slates, crossing over the water channel and/or watching tadpoles in the pond for a median time of 1 minute and 17 seconds per person (Note 9). One of the teachers mentioned that it was unusual for the students and teachers to see tadpoles in the pond. Birds were also often seen taking a dip in the stone slate channels and chirping on trees in the sensory garden (Note 10). A negative affordance was recorded at the *Water Garden*. Teachers were concerned about the surface of the boardwalk near the pond because it was slippery and hazardous for students. This corresponded with the teachers' interview where they said that this surface material was one of the least successful in terms of use. As a result, two staff and two students feared using the slippery boardwalk near the pond, so they used the steps instead (Note 11). Among the potential affordances that were observed, firstly, students in their wheelchairs wanted to continue their exploration of the boardwalk but did not manage to do so because the path came to an end (Note 12). Secondly, the teachers expressed their frustration at the interactive fountain not working because some of their students loved watching and talking about this design feature.

The least frequency was recorded at the *Rainbow Walk* (zone A) with only 51 multiple affordances but a greater total time spent there of 135 minutes and 30 seconds, compared to the *Water Garden*. This implies that each user spent a median of 3 minutes and 5 seconds in this zone. The teachers preferred to use this area as an outdoor classroom in support of the communication therapy. The activities that occurred there included cheering, singing, skipping, jumping, stamping their feet and clapping hands (Note 13). The following anecdote illustrates how users of the sensory garden utilised the *Rainbow Walk* as an outdoor classroom:

One morning, a group of teachers and students with various kinds of impairment were walking hand in hand, through the sensory garden of the school to find the perfect tree to do some tree-rubbing. As they neared a huge shady tree, a teacher said, *"Let's feel this tree"*. She placed her hands on the tree trunk. A student moved her hands over the bark and slid his arms around the trunk until they met. His face was touching the bark and he said, "*This is the perfect tree"* So they all got out their paper and pencils and started a tree-rubbing activity.

To conclude, this signifies that the frequency of actualised affordances reflects the number of users, whereas the frequency of time spent cannot be taken to reflect the frequency of actualised affordances and the users, based on the evidence.

7. The Interview Results

In this study, the focus of the analysis was on observation and behaviour mapping. The interview material is the secondary data of the study (Hussein, 2009b). The interviews are a very good way of reinforcing what is in the data and giving it more of a personal viewpoint, as Zimring and Reizenstein (1980:442) stressed, *'Once the clients' and landscape architects' intentions are known, they are checked with actual user experience as measured by interview, questionnaire, direct observations and so forth'*. The interview outcomes showed that the interviewees preferred:

1) Zones with a hard surface pathway, allowing accessibility and easy way finding into the sensory garden and back to the school building.

2) Zones with a variety of attributes that are placed adjacent to the pathway, which offered users to easily engage with it, thus afforded them a richness of activities in the sensory garden.

Therefore, the functional attributes and good circulation network were the properties of the sensory garden that afforded users the opportunity to undertake a variety of activities. This concurred with Cosco's (2006) study on physical activity affordances in preschool play centres that diverse areas comprising pathways and features are likely to be the most active.

8. Discussion

This section discusses the research questions and conclusion, which is based upon the interviews, observations and behavioural mapping of the study. This section ends with limitations of the study and final conclusion.

8.1 The Use of Area in Sensory Garden

In the use of area in the case-study sensory garden, it is clear that wherever there is access, the students will undertake a variety of activities and engage more with the attributes compared to the staff. This contributed to the finding that the number of attributes, the number of activities undertaken and the time spent engaged in that activity by the users was not dependent on the total area of the zone nor did it relate to the median time spent there per user but rather what did enable the usage was the functioning of the attributes and access to them. It is possible that for a disabled student, sensory experiences are much more important. Designers need to consider, but should undertake more research to find out, if certain sensory experiences are richer or more vivid experiences for students with disabilities than for able-bodied staff. It is important, therefore, to look at the different range of sensory experiences that could made available, for example, the growth of moss on the raised planters, the wildlife, microclimate and weather factors. These features, which offer sensory stimuli could introduce students with special educational needs to different aspects of landscape and help them to learn and understand more about the cycle of growth.

8.2 Users' Engagement with the Attributes

Why should designers pay attention to the three affordances? How are these affordances valuable to designers?

1) Actualized and potential affordances

Actualized affordances let designers know the opportunities with which users engage, while potential affordances are those which seem to be offered in a sensory garden. For example, students in wheelchairs wanted to touch and smell the herbs in the raised beds on offer but did not manage to because the inaccessible design of raised beds made that impossible. In that case, what originally must have seemed to the designer as offering potential affordances was, in practice, impossible for the students in wheelchairs, who may have seen the potential but they were unable to engage with the scented plants and herbs because the raised beds which are inaccessible, made this impracticable. Designers of sensory gardens may think they have designed to allow potential affordances to occur, however, the evidences show that designers need to think of the design of a sensory garden as requiring further refinement to ensure that users are fully able to realize all actual and potential affordances.

2) Unique and multiple affordances

A sensory garden feature that affords more than one experience is potentially of greater value than a feature that offers only one affordance because it provides a range of affordances and a richer experience for the users. For example, the water feature did not work during the observation period. Instead, this feature was only talked by six users; with a time spend of less than 1 minute per user. Another attributes, such as seating afforded multiple affordances, such as sitting and lying down; for example, a hearing-impaired student sat beside his teacher on a seat. After a while, the student stretched out on the seat, with his head on his teacher's lap. They were communicating (including via sign language) and sat there for 1-2 minutes. Designers of future sensory gardens will want to consider the full range of affordances so that they know the value and use of the gardens, such that are likely to enhance users' sensory, physical and social capabilities.

3) Positive and negative affordances

Most literature on the sensory environment (Building Bulletin 102, 2008; Woolley, 2003; Frank, 1996; Stoneham, 1996; Titman, 1994) has discussed the rich sensory experiences that users encounter. The literature shows, and this study's observations confirm, that affordances can offer unpleasant as well as pleasant experiences. Designers should not assume that every experience is positive and this study has differentiated pleasant from unpleasant by observing and recording users' experiences in each garden. Teachers and therapists, however thought that some negative experiences were important in terms of users' sensory, environmental and social learning.

As the examples of actualised and potential, unique and multiple, positive and negative affordances show, i.e., users' engagement with the attributes, designers might want to consider all these affordances when designing for sensory gardens.

8.3 Designer Involvement and Understanding

Nebelong (2008:20) stated that, "*Designing sensory gardens and play spaces for children with physical or mental diseases is a question of designing accessible spaces that work for all children, irrespective of abilities and skills".* It is clear that Nebelong feels that it is crucial for designers to understand the engagement that occurs between users and their surrounding environment. In special education environments, it is particularly hard to generalise about design requirements, as schools tend to vary enormously in the range of special educational needs and ages that they cater for, as well as the more predictable variability they offer in term of their total area and site context. Success may rely upon a close partnership between the designers and environmental professionals, and the teachers and children (Stoneham, 1997:26). Noel Farrer (2008:11), of Farrer Huxley Associates, also noted that, *"successful school grounds depend on getting the input and backing of one key group: You have to get close to the teachers, particularly ones prepared to push boundaries…"* Farrer stressed also the importance of collaboration between design professionals and users when designing to cater for users' needs.

9. Research Limitations

The study outcomes were limited because they were based on:

1) The behavioural responses of all users in the case-study special school only. The researcher did not explore the specific disabilities of each student in the case-study school, or their particular usage of the sensory garden; students in Lyndale School have individual schedules. It would have been impossible to undertake research on each student's usage of the garden in terms of how their specific needs or disability allow them or created barriers to full use of the garden since the data collection was restricted to spring and summer school terms. Hence, the findings cover the range of user disabilities in the case-study special school.

2) Walk-through interviews with the students were not undertaken because the researcher found it was particularly difficult to get first-hand information from students due to communication difficulties, thus she observed them using the sensory garden by behavioural mapping methods.

10. Conclusion

The layout of pathway network linking the sensory garden to the overall site context is crucial in encouraging the number of users who will engage with the attributes placed along it. It does not matter what sort of attributes are included to offer variety to users – as long as they are accessible and functional, users will be engaged by them. This finding echoed research undertaken by Moore and Cosco (2007) on inclusive parks, which showed that a highly positive feature and the one that was the most popular among users, was a pathway that gave access to the facilities that were readily accessible. It is the layout of pathway and pathway connectivity, therefore, that enables user behaviour and use of area rather than users seeking out corners or zones which have particular attributes. This is a significant new knowledge, from a design point of view, indicating that pathway layout is more important than the particular design of attributes, as long as the pathways are accessible. As the case-study showed, the integration of sensory garden design into the overall design of special schools, and its inclusion in the curriculum, could encourage the creation of an outdoor environment which could offer a wide range of sensory learning experiences for children with special educational needs. The students' experience at the case-study site showed positive user functioning in three aspects: sensory stimulation, physical (mobility), and social (speech and communication). For example, for student with special needs, getting to, and around the sensory garden, then back to the school building (way finding), was particularly important to them as many, if not all, had some form of mobility impairment.

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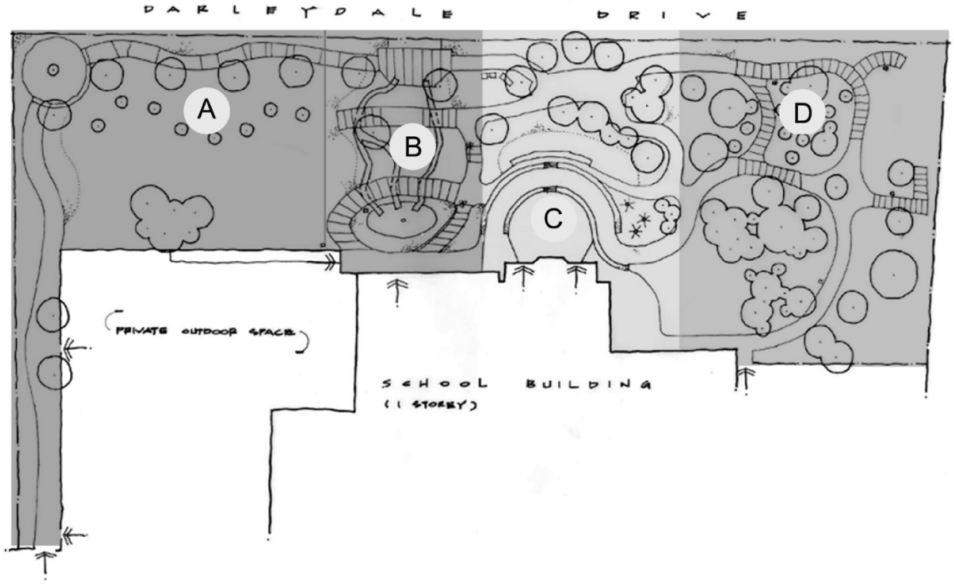
Notes

Note 1. Plan of the sensory garden, showing the zones and attributes of the Lyndale School.

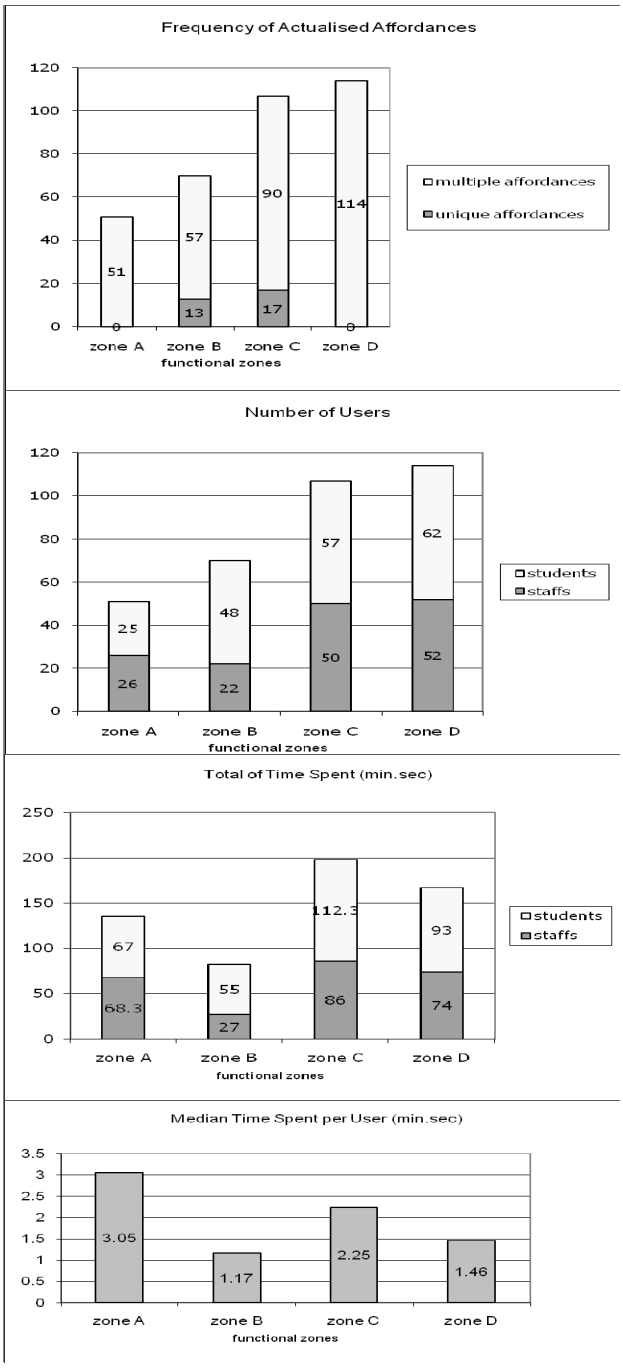
Legend: Zone A: *Rainbow Walk*, Zone B: *Water Garden*, Zone C: *Green Space,* Zone D: *Woodland Garden*



Note 2. Frequency of actualized affordances recorded in the sensory garden of the Lyndale School, according to the functional zones.

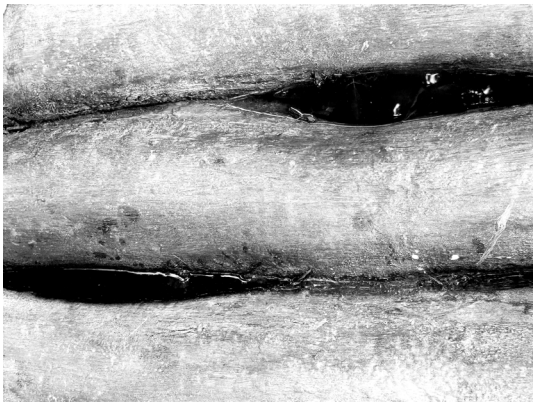
Legend: Zone A: *Rainbow Walk*, Zone B: *Water Garden*, Zone C: *Green Space,* Zone D: *Woodland Garden*

Note: The total time spent for the students and staffs were combined in the median time spent per user



Note 3. One of the sound stimuli located at the end of the boardwalk.

Note 4. Students were observed engaging with the water trapped between logs at the artwork display.



Note 5. A covered tunnel with climbers that had been installed in the sensory garden a few weeks before the observation period began in July 2007. It was woven by a group of students with the help of a specialist and their teacher. While walking underneath the covered tunnel, users were keen to take photographs of this feature.

Note 6. The richness of attributes at the *Green Space*.

Note 7. Lavender along the pathway at the *Green Space*.

Note 8. Students in wheelchairs often asked for staff assistance (including via sign language), as they could not reach up to touch and smell the plants in the raised beds.

Note 9. The Water Garden offers the opportunity to feel the texture of the slates, watch tadpoles and to cross over the water channel.

Note 10. A bird taking a dip in the stone slate channel

Note 11. Some users preferred using the steps instead of the ramp at the end of the boardwalk, even though they were in their wheelchairs, due to the slippery surface.

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Note 12. The boardwalk that stops abruptly at the *Water Garden*, hence students in wheelchairs had to turn back.

Note 13. Besides utilising the *Rainbow Walk* as an outdoor classroom, users also carried out tree-rubbing activities.