Using the sensory garden as a tool to enhance the educational development and social interaction of children with special needs

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This study summarises the findings based on two case study sensory gardens in the United Kingdom, in terms of the educational development and social interaction of children with special needs and the staff who care for them. The aim was to observe and record the users' behaviour when engaging with features in the sensory garden. The data collection included interviews with teachers and therapists, and behavioural observation, which was used in conjunction with affordance theory. The study was supported with a few noteworthy incidents that the author recorded as anecdotal evidence. A selection of photographs was chosen to illustrate these incidents.

***Key words*: behaviour, children with special needs, educational development, sensory garden, social interaction.**

Introduction

Multi-sensory design, focusing on the garden as an outdoor environment, is becoming increasingly popular for educational purposes in special schools (Titman, 1994b; Frank, 1996; Stoneham, 1996; Woolley, 2003; *Building Bulletin 102*, 2008), for rehabilitation purposes in hospitals (Cooper and Francis, 1998; Tyson, 1998; Cooper and Barnes, 1999) and for health benefits in nursing homes (Stoneham and Thoday, 1994; Stoneham, 1997).

Robinson (2008), an Inclusive Designer with the Sensory Trust, defined 'sensory' as 'relating to the senses or the power of sensation'. The *Oxford American Dictionary* defined 'sense' as 'A faculty by which the body perceives an external stimulus: one of the faculties of sight, hearing, taste and touch, smell'. In this study, the term 'multi-sensory' describes the multiple bodily senses to which children with special educational needs, in the two sensory gardens selected, could be exposed; namely, to a stimulating environment that is designed to offer sensory stimulation using textures, colours, scents, sounds, etc.

What is a 'multi-sensory environment'?

According to Pagliano (1998, p. 107),

> 'A multi-sensory environment is a dedicated space or room . . . where stimulation can be controlled, manipulated, intensified, reduced, presented in isolation or combination, packaged for active or passive interaction and temporally matched to fit the perceived motivation, interests, leisure, relaxation, therapeutic and/or educational needs of the user. It can take a variety of physical, psychological and sociological forms'.

Pagliano (1999, p. 14) explained:

> 'The multi-sensory environment is a "living environment" where a physical environment is determined by the needs of the user and shaped by the intelligence and sensitivity of the disciplinary team that manages it'.

He added: 'the multi-sensory environment literature can be divided into four themes, each describing a particular type of multi-sensory environment' (Pagliano, 1999, p. 14). The first three themes are for leisure and recreation, therapy and educational benefits, while the fourth theme is any combination of the three. Since I selected school-based sensory gardens, this study considered the fourth theme, that of a multi-sensory environment which is created for leisure, recreation, therapy and educational use. This type of environment provides an area for users to control, manipulate, intensify or reduce stimulation within a safe environment (Best, 1992) while relaxing, interacting and learning from one another (Glenn *et al.*, 1996).

Evolution of the multi-sensory environment

Hirstwood and Gray (1995) and Hogg *et al.* (2001) stated that the evolution of the construction of multi-sensory environments began in the 1970s. However, it was only in the late 1980s that they began to take account of visual and aural ambiences and to install equipment that could accommodate the needs especially of people with profound and multiple disabilities in special schools and nursing homes (Mount

and Cavet, 1995). Hogg and Sebba (1986) and Longhorn (1988) examined the development of auditory, physical and visual disabilities in people with profound and multiple disabilities, and they developed respective multi-sensory curricula. Longhorn (1988, quoted in Mount and Cavet, 1995, p. 52), suggested:

> 'without stimulation and an *awakening* of the senses, children with profound and multiple learning difficulties would find it almost impossible to make sense of their experiences and to begin to learn' (emphasis in original).

As a result, a multi-sensory curriculum was integrated into the special needs educational system to accommodate the United Kingdom's National Curriculum (Mount and Cavet, 1995; Byers, 1998). Following on from the recognised positive multi-sensory indoor experiences, sensory gardens have literally developed out of this (Nebelong, 2008). The only difference is that the cost of having a sensory garden is considerably less and it is a truly natural multi-sensory environment compared to a manufactured multi-sensory or 'snoezelen' room (Lambe, 1995).

In this study, a sensory garden could also be described as offering a variety of sensory stimuli to children with special educational needs, just as they are to be found in the 'snoezelen' rooms. The study summarises the findings based on two case study sensory gardens in the United Kingdom, in terms of the educational development and social interaction of children with special needs and the staff who care for them. The aim was to observe and record the users' behaviour when engaging with features in the sensory garden. The data collection included interviews with teachers and therapists, and behavioural observation, which was used in conjunction with affordance theory.

Play, outdoor education and disability

The *Building Bulletin 102* (2008) outlined what is necessary when designing for children with special educational needs. One of the requirements when designing a special school is to provide an accessible outdoor environment, which emphasises multi-sensory experiences for therapy, educational and recreational use.

Play

The National Voluntary Council for Children's Play defined play as:

> 'a generic term for a variety of activities, which are satisfying to the child, creative for the child and freely chosen by the child. The activities may involve equipment or they may not, be boisterous and energetic or quiet and contemplative, be done with other people or on one's own, have an end product or not, be light hearted or very serious' (National Children's Bureau, 1992, p. 4).

Striniste and Moore (1989) signified 'play' as 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 regard to how users, particularly children, use the outdoor environment, play is clearly a significant (Moore, 1986; Titman, 1994a) and essential requirement for children's' well-being and development (Lansdown, 1996).

Wolff (1979) described the quality of play as allowing 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 environmental features, allowing a child to experience an environment that is safe, pleasurable, creative, stimulating, adventurous and spontaneous, which at the same time affords a child opportunities for play.

Wolff (1979) categorised play into six types as follows:

1. *Solitary play* is defined as an activity that a child plays alone without interaction with others. This type of play offers no social skills but a sense of privacy.
2. *Parallel play* is when a child engages with a similar activity to his or her peers without interacting with them, verbally or physically.
3. *Positive interaction with peers* is a play behaviour between a child with another that sometimes involves verbal communication. This play category affords social skills, such as sharing: for example, climbing or sliding down the slope together while talking, etc.
4. *Negative interaction with peers* is a type of play that involves aggressive behaviour, such as fighting, refusing to share any play features, unwilling to help or work together with a peer, etc.
5. *Positive interaction with adults* is when a child is willing to work together with an adult by offering or receiving help. This play behaviour affords social skills, such as communication.
6. *Negative interaction with adults* is when a child is being non-co-operative with an adult, for example resisting interaction, kicking, screaming, etc.

Examples from the six types of play behaviour above showed that children understand the functional properties (affordances) of the environment by experiential involvement through perception and movement, that is, play. Thus, play should be recognised alongside education as a vital part of children's healthy and happy development.

Outdoor education

Having an accessible school ground, for example a playground (Titman, 1994a) or a sensory garden (Westley, 2003), is highly important for children to give them the opportunity for free play and choices for exploration and learning. They also value an environment that can provide

them privacy (Moore, 1986). Titman (1994a, p. 58) identified four elements that children looked for 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 value of improved school grounds as an educational resource to demonstrate how children's attitudes, behaviours and learning skills could be enriched.

According to Bell (1993, quoted in McLinden, 1997, p. 321),

> 'Each adult working with a child with multiple disabilities has an important role in ensuring that the child is able to make sense of the environment using appropriate information from a range of sensory channels. In attempting to provide the child with a balanced understanding of the environment, the adult will need to structure an appropriate learning environment which can be both reactive to the child's actions and responsive to the child's needs'.

One of the ways to achieve an environmental education is to choose plants that are fast growing, able to provide shade and able to offer visual stimulation through the use of colour, texture and scent. Plant compositions must be carefully considered so that they provide mystery and the ability to hide and to create space. One example of a school that has built this kind of environment is Meldreth Manor School in Hertfordshire (Frank, 1996; Stoneham, 1996). The sensory garden there was designed with a series of ramps and raised pathways integrated and woven around the existing apple trees; while preserving the trees, it offers pupils a variety of sensory experiences.

Educational benefits

Having a multi-sensory environment in special schools is beneficial for both teachers and pupils as it provides a two-way learning process. As outlined in the *Building Bulletin 77* (1992, p. 49),

> 'External spaces can provide opportunities for observation, investigation and problem-solving and form a flexible facility often more readily adaptable to change in user requirements than the building itself. They can offer a stimulating environment suited to practical activities from which many pupils with special needs can benefit'.

This idea matches the beliefs of Titman (1994a), Lucas (1996), Stoneham (1997) and Moore (1999) that outdoor environmental learning can give children a stimulating experience as well as influence their behaviour and their development in terms of social relationships. Lucas (1996, p. 26) added that this notion has received further support from Barbara Dunne of the Royal School for the Deaf and Communication Disorders, Manchester: 'Pupils are most likely to succeed when they are involved in "doing" activities rather than academic learning. Environmental education is an ideal activity learning medium'.

The research findings of Rohde and Kendle (1994), Malone and Tranter (2003) and Maller and Townsend (2005/2006) have proven that providing school grounds with sensory stimulation can encourage mental development, health improvements, emotional growth and social integration, in addition to increasing the learning motivation of the pupil, especially through being in contact with animals and plants. Stadele and Malaney (2001, p. 213) mentioned that for children with autism, they may 'seek sensory stimulation from the environment in order to calm or self-regulate their nervous system'.

Learning through Landscapes, an association that was formed in 1990 in the UK, has also conducted research concerning children with special educational needs in outdoor areas. The findings made apparent that teachers appreciate outdoor areas as a foundation for the education of children with special educational needs. Among the other special benefits of having outdoor areas in special schools is that they can assist in reducing aggressive behaviour and bullying. Outdoor areas can also be used as a setting for counselling sessions and thus they encourage positive behavioural change (Stoneham, 1997). In 1999, the Healthy Schools Programme in a joint initiative with the Department of Health was established in the UK for children and young people in schools (see http://www.healthyschools.gov.uk/Default.aspx). One of the initiatives is to develop a garden or horticulture-based activity such as organic gardening that can both improve an external area in or near to the school and provide a meaningful focus for a range of subjects, such as science, art or other projects in the curriculum. This initiative provides benefit in terms of developing healthy behaviours, reducing health inequalities and promoting social inclusion among children and young people in schools.

To conclude, multi-sensory environments are used by individuals with all kinds of disabilities in special schools where this offers them the opportunity to engage in self-stimulating activities. Research by Long and Haigh (1992) on disabled people showed that they responded positively towards the sensory/snoezelen environment. Stadele and Malaney (2001) undertook further research to see whether negative behaviours among people with autism decreased when they used multi-sensory environments. Findings showed neither positive nor negative effects of a sensory room intervention on the negative behaviours. In other words, there was no clear pattern of decreased negative behaviours. However, individual patterns of behaviour were recorded in the two children with autism.

Disability

Mount and Cavet (1995) and Chawla and Heft (2002) mentioned the richness of the visual, auditory and tactile stimuli

that gardens can offer and the opportunities they could offer for exploration and, thus, how they 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. The principal of Farrer Huxley Associates (Farrer, 2008, p. 17), stated:

> 'When designing for children with disabilities, it's vital to understand that their senses are completely different. You are not dealing with the same sort of physicality, you are dealing with texture, smell and sound; motor skills are far more localised'.

Research by Passini and Proulx (1988) and Jacobson (1998) found that it is easier for a visually impaired person to orientate and navigate in the outdoor setting when landmarks and walkways are distinguished through texture or other means as clues. Tyson (1998, p. 75) noted that 'the composition of selective plantings, strategic location and significant elements could orientate people with impairments around green spaces'. Kaplan *et al.* (1998, p. 50) supported this view: 'The distinctiveness of such elements, where they are placed, and the number of them are all key aspects of designing for way-finding'. For example, during one of the observation days at the case study sites, 'Eileen', who has special educational needs, was able to find her way back to her classroom after the literacy session through the use of plants.

McLinden and McCall (2002) 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' (p. 54). For example, during the observation period at one of the case study sites, a teacher expressed her feeling that it was a pity that the water feature was not working because her visually impaired student loved to hear the sound of the water and when he did, he would remain near the water feature for a longer period.

Best (1992, quoted in McLinden and McCall, 2002, p. 99), stated:

> 'when facial expression and tone of voice are too sophisticated (through learning difficulties) or inaccessible (through sensory impairments), then touch is the primary channel of communication for the children. Information and emotions will be conveyed through touch and so the adult will need to ensure that the intended message is being conveyed'.

It is evident from the research findings from both case study examples that the sense of touch has the highest sensory stimulation compared to other senses among the users of the sensory garden.

The results

The interviews with the teachers and therapists of both case study sites showed that, since the sensory gardens had been introduced, the children had benefited in terms of their educational development and social interaction. These benefits were as follows (evidence recorded during the observation periods; the number of teachers and therapists (total of 15) who responded during the interviews is shown as 'n').

Responses to the environment (n = 9)

Walking under a row of shady trees on a sunny afternoon might be evaluated as a comfortable ambience in which to undertake such an activity. In contrast, a stormy day with heavy rainfall might be evaluated as an undesirable situation in which to be in the natural landscape. Cool temperatures in the morning and evening afford users the chance to enjoy the weather in comfort, whereas high noon temperatures sometimes need to be avoided. For example, a child with multiple disabilities became agitated because it was too sunny. His accompanying teaching assistant did not what to do as the situation got out of control. Another teaching assistant, who happened to pass by, had to carry the child indoors.

Educational resource (n = 4)

Although the willow tunnel is located towards the end of a sensory garden in one of the case study sites, some children liked to use this feature to hide in, to play with the artwork displays and to spread their arms wide while feeling the willow (see the anecdotal evidence below).

> *'One morning in the observation period, two teachers decided to experience the willow tunnel with one student who was in a wheelchair and one student who was partially sighted. The two teachers went through the willow tunnel and waited for more than five minutes as both of their students had a fear of going through the tunnel due to the changes in its material. One of the teachers tried to convince both students by saying, "Come on, Steve . . . you can do it!" while the other teacher walked through to the end of the willow tunnel and said, "Look! I'm here". The students looked surprised. Then she walked back through the willow tunnel and cheered on both students to join them. The partially sighted student put one foot tentatively on the chip-bark surfaces. He then smiled and walked slowly towards his teachers. As he approached, one of the teachers held his hands and said, "Yes! You've made it!" The other student in his wheelchair was still on the pathway. He looked confidently at his mate and slowly wheeled his chair on to the bark surface. They continued to cheer him on. As he came closer to them, one of the teachers said, "Well done, Steve!" They then engaged with the willow tunnel.*

One teacher and one student played with some of the artwork displays while the other pair spread their arms wide while feeling the willow. The four of them finally walked towards the end of the willow tunnel and returned back to the pathway. Besides experiencing the features at the willow tunnel, it also increased the students' confidence.'

Another example from one of the case study sites illustrates how a speech therapist used the images on the rubber walkway to encourage verbal communication. One afternoon in the observation period, a therapist and a child with speech difficulties were strolling in the sensory garden. When the therapist reached the rubber walkway (see Figure 1), she jumped on to one of the images and said, '*Flower!*' Then she jumped from the 'flower' on to a blank space and let the child jump on to the flower image. The child copied what her therapist had done and responded very well. Seeing that the child had behaved positively, the therapist continued jumping on to a series of different images until the end of the walkway. The rubber walkway, therefore, afforded jumping and communication.

Enjoyment (n = 3)

At the Lyndale School in Wirral, a number of teachers and children who were physically able enjoyed stamping on the boardwalk and making a noise. Teachers drew the children's attention to the vibration and sound of the boardwalk (see the anecdotal evidence below).

'As the teachers and children gathered in pairs around the conifer tree, with a plank as the floor surface, the teachers sang, "Here we go round the mulberry bush". As they chanted, the author thought it was a perfect song to sing as it invited many physical movements that generated sound and vibration for the children, such as stamping, jumping, skipping, clapping and cheering. The children responded positively by swinging their hands while turning their heads from one side to another. Some children opened their mouths and tried to mimic their teachers.'

Figure 1. A speech therapist and a child with speech difficulty were recorded using the images on the rubber walkway to encourage verbal communication
Note: Photographs were taken by the author in the sensory gardens but none include shots of the users due to the school policy.

Calming (n = 2)

A child in her wheelchair and a teaching assistant would stroll in the sensory garden from 12.00 p.m. to 12.30 p.m. Sometimes she could be there until 1.00 p.m. It did not matter if it was a rainy or windy day, she would be in the sensory garden (see the anecdotal evidence below).

'It was windy and drizzly. A young girl in a wheelchair was in the sensory garden with her teaching assistant. She was quiet and just sat still in her wheelchair, feeling the rainwater running on her cheek. Her teaching assistant kept on wheeling her despite the weather. At one point, the teaching assistant stopped to tie her own shoelace. The girl opened her mouth and shouted out loud, shrill noises while jumping a little in the wheelchair. She was irritated! The teaching assistant knew that she disliked that they had stopped and explained to the girl in sign language why she had to do that. After a short while, the teaching assistant gently wheeled the girl on. Passing the water feature and the scented plants at the raised beds, the girl became silent. Now the only noises that could be heard were the wind in the leaves, the trickling water from the water feature and a little splashing on a puddle.

Pleasant and stimulating experience (n = 2)

In both schools, staff and children liked to brush their legs and hands against the lavender while walking on the pathway. A few of them smelled their hands after touching this scented plant. In a preliminary interview I conducted with Gough, a teacher of the Royal School of Deaf and Communication Disorders in Cheshire, she mentioned a child with poor sight who trails very well, using the lavender and when she (the child) smells it, it reminds her of her mother at home, who had it planted in her garden. Children on specially adapted bicycles also liked to feel the soft texture of the moss against the rough texture of the raised brick beds (see Figure 2).

Encourages team work (n = 2)

The covered tunnel with climbers was constructed by a group of children with the help of a specialist and their teacher. Once completed, users were keen to take photographs of this feature (see Figure 3).

Supports the National Curriculum (n = 2)

One of the standard multi-sensory curriculum items, used by teachers in all special schools, is the Picture Exchange Com-

Figure 2. Children with special educational needs liked to feel the moss on raised beds

munication System (PECS). PECS allows staff and children with autism and other communication difficulties to initiate communication. This involves showing photographs and finding objects in the sensory garden using touch, hearing, smell and sight. Literacy sessions are also conducted in the sensory garden. Both of these exercises are beneficial for way finding, mobility, speech therapy and identifying significant features in the sensory garden.

Conclusions

Based on the results of the interviews, together with selected recorded evidence from behavioural observation, it is clear that sensory gardens were used in an educational context to stimulate the senses, to increase tactile qualities to support way finding and mobility, to encourage behavioural changes and social interaction as well as to support their mental development, hence renewing their functioning through engaging with and responding to the environment. These observed positive developments are important in outdoor environmental education; for example, plants found in both school settings encouraged a greater understanding of and exploration by users, afforded easy way finding and generated activities. Thus, children with special educational needs recognised the functional properties of their outdoor environment. However, if these needs are not met, users may feel frustrated and even threatened; thus it will add to their fears and apprehension.

Figure 3. A covered tunnel with climbers that had been installed in the sensory garden a few weeks before the observation period

Climatic factors such as temperature, wind and rain also contribute to the sensory experiences that trigger users' senses and affordances. Thus, allowing users the opportunity to engage with natural forces supported the link that has been established between personal experiences and developing environmental cognition; an individual learning process has to occur to allow people to understand the benefits or disadvantages of the natural elements. Their memories of familiar features and reflections on their past experiences at home were vivid, signifying positive behaviour. As a result, the users showed a strong sense of bonding, such as preference for and attachment to the garden by suggesting improvements to its content and showing their willingness to come back to the sensory garden. Finally, and perhaps most importantly, sensory gardens should be incorporated in the design of special schools as part of their sensory learning curriculum. Design of the sensory garden should be considered during the pre-planning stage of the special school development, which would allow the architect, teachers and therapists to allocate space to the sensory garden and to see it as an extension of the school's indoor classroom rather than just as an outdoor space.

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