

This report has been written for the staff at Sunfield School. A supplementary report from July 08 is also now available.

## **Learning Environments End of Year Report July 07**

### **An overview of the project**

The aim of the Learning Environments research project is to develop an environment which provides optimal support towards meeting the needs of children with profound autistic spectrum disorder in order to assist them in engaging as effective learners. The project began in October 2006, and is intended to run for 3 years. To date, the small amount of research surrounding the idea of providing optimum environments for those with profound autistic spectrum disorder (ASD) has focused on living environments (Whitehurst, 2006; Beaver, 2003 and 2006; Humphreys, 2005; Plimley, 2004), rather than learning environments. An initial review of this literature has indicated that there are three main avenues to focus on when developing optimal learning environments for children with profound ASD. These are the physical environment, the pedagogy and related resources utilised to teach lessons and structure classroom activities, and the teaching staff.

### **The Physical Environment**

Much of the more recent research surrounding autism has tended to focus on the sensory processing difficulties experienced by those with ASD (Bogdashina, 2003; Baranek, 2002; Dunn et al, 2002). Hinder (2004), describes seven senses – visual (sight), auditory (sound), tactile / cutaneous (touch), vestibular (balance), proprioceptive (the position of our body in space), gustatory (taste) and olfactory (smell), all of which are often either hyper or hypo sensitive in those on the autistic spectrum. The consequences of sensory dysfunction in any or all of these senses are numerous and probably endless, and as outlined by first person accounts of adults with autism, such as Williams, 1992 and 1995, Grandin 1995 and Lawson 2000 these sensory problems impact on almost every area of their day-to-day functioning. It would thus seem essential that an optimal environment for those with ASD, and in particular one in which they are expected to learn and develop, utilises strategies to minimise the effects of this sensory dysfunction.

### **LECA**



The first classroom modification undertaken was the introduction of Leca furniture. This furniture, originally designed by Rob Burn to support the needs of children with Aspergers Syndrome in Holland, incorporated the concepts of curvilinear design and Temple Grandin's squeeze machine to provide each child with a "personal domain" in which to work, whilst at the same time providing space for group work at a central circular table (Burn, 2005). Temple Grandin's squeeze machine is a device she designed to provide the sensation of deep pressure often craved by those on the autistic spectrum as a result of tactile dysfunction. By designing furniture which encircles the child, Burn hoped to provide the illusion of feeling 'squeezed'.

The concept of curvilinear design holds its origins in the work of Rudolf Steiner. Steiner founded Waldorf Education, an approach based on his educational philosophy and spiritual philosophy anthroposophy. Waldorf Education is a holistic and child-centred approach to teaching which recognises the importance of not only the approach to teaching but also the design of the classrooms. Steiner believed that classrooms and school buildings must derive from the nature of the activities taking place within them such that they support the educational learning and human development that is intended (Adams, 2005). Steiner imagined "every classroom ... shaped by an artist in such a way that each single form is in harmony with what his [the child's] eye should fall upon when the child is learning his tables" (Steiner, 1958 & 1975).

More recently, Whitehurst (2006), describes new residential living accommodation recently built at Sunfield School for up to 12 children with profound ASD, which utilised curvilinear design to replace right angles in the overall shape of the building. This was found to be successful in facilitating the children's movement through the

house by reducing the impact of the kinaesthetic and proprioceptive dysfunction often experienced by those on the autistic spectrum.

The introduction of the furniture was originally intended to coincide with the start of the new academic year in September, however as a result of some delays in manufacturing, it was decided that it would in fact be in the best interest of the children to delay the installation until they had had a chance to settle into their new class. This was beneficial both in terms of data collection and for the children's well-being since many of the children involved in this research project respond well to routines and structure, and it was evident that it took a few weeks for them to adjust to the start of the new school year and their new classroom, teaching staff and peer group. As such their anxiety and stress levels had notably lowered by the time the decision was made to introduce the Leca furniture.

The furniture was installed in the research classroom on 28<sup>th</sup> November 2006. Unfortunately, for health and safety reasons, the 5 person pod was removed two weeks later, and the 2 person pod was removed in May. An evaluation of the Leca furniture found that it gave rise to a number of difficulties which affected the level of support the children were receiving as well as their levels of engagement throughout the school day. A summary of the main issues is listed below.

- The close proximity of the students increased the extent to which they were poking, spitting at and generally irritating each other, with the result that they were engaging less in group activities and there was a rise in the level of incidents, stress and general unease in the classroom.
- The absence of space for the teaching assistants within the framework of the group table made group work chaotic and highly stressful for both the staff and students. This also reduced the level of support the children were receiving to participate in the group activity, thus diminishing their involvement and decreasing the extent to which they benefited from the activity.
- Despite the overall size of the furniture, neither the group table nor the 1:1 work spaces were large enough to support the poor motor skills of the children and enable them to complete work independently.
- The absence of individual work stations from the furniture design meant that the children's work stations remained in the classroom, and these together with the size of the Leca furniture made the classroom increasingly claustrophobic and created problems in navigating the classroom and accessing all areas.
- The furniture was very large and inflexible, and as such could not easily be moved or modified to meet the fluctuating needs of the children.
- A central removable circular disc was a distraction to the children and raised significant health and safety concerns due to the risk of it being thrown.

On a positive note, it was observed that

- There was an improvement in the looking and engagement of one child when he was participating in group activities during circle time, possibly as a result of his close proximity to the class teacher.
- One child in particular appeared to really feel comfortable within his pod and chose to spend the majority of choice time reading within it. However staff also noticed that this coincided with a decrease in his interaction with others in the classroom and a reduction in his requests to be read to.
- Staff commented that the individual pods provided a very secure and comfortable environment, and a feeling of safety for the children.
- Staff commented that the curves contributed towards a calmer atmosphere within the classroom when the furniture was not being used to full capacity.

### Chair Material



The second phase of the Learning Environments research was to reupholster the comfy chairs in the classroom. The chairs were in need of reupholstering due to the fact that some children in the classroom had bitten through the existing fabric and were peeling it off. The colours chosen for the chairs were on the pink/purple spectrum as promoted by the colour impact research by Pauli (2004,2006,2007). Two different materials from different manufacturers were trialled, both with a vinyl finish. The newly upholstered chairs were introduced to the classroom on 16<sup>th</sup> April 2007. Although both fabrics appear stronger than the previous fabric was, they have failed to prove bite-proof, and thus the search continues for a more robust chair covering.

### Lighting



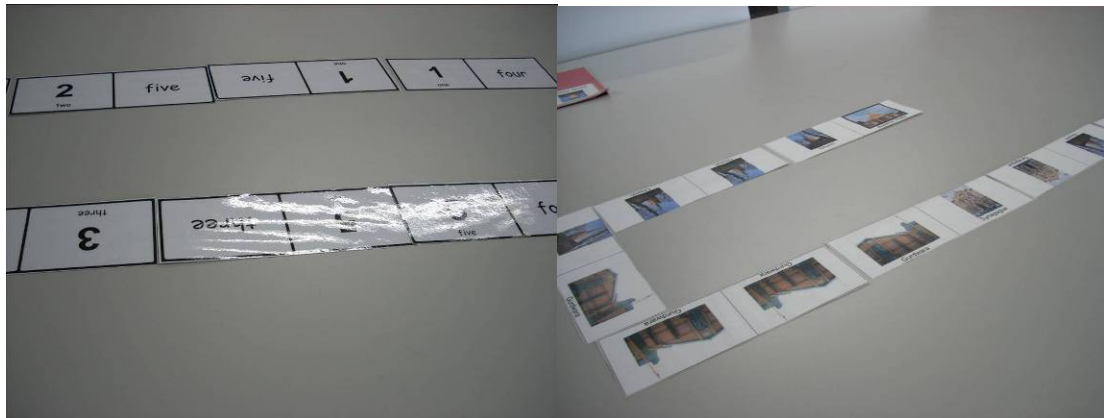
The third phase involved replacing the classroom's strip lighting with daylight bulbs. The rationale behind this move stemmed from the research indicating that those with ASD often experience an aversion to very bright fluorescent lighting due to their visual dysfunction since the fluorescent flicker affects their visual field (Irlen, 1991). Prior to the lighting being replaced, it was observed that

- One child frequently turned the lights off when stressed, anxious or tired.
- Another child exhibited increased finger-flicking when at group table positioned in front of the fluorescent lights compared to anywhere else in the classroom.
- All the children chose to spend the majority of their choice time by the windows where natural lighting is prevalent.
- Staff commented that the lights caused a lot of glare/reflection at the group table which hindered the children's ability to see their work and concentrate.

Interviews with staff working within the new Sunfield residential accommodation designed to meet the needs of children with profound ASD (Whitehurst, 2006) indicated that the new daylight tube lighting reduced glare and produced a calmer atmosphere within the house. During a follow-up interview by the current researcher staff also commented that the children living there had stopped staring at the lights, something which they had previously done frequently with the old lighting.

The new lighting was in place for 16<sup>th</sup> April 2007. Observations so far regarding the efficacy of the daylight tubes indicate that the children have noticed the change. When the new lighting was first introduced the children were turning the lights on and off repeatedly and were staring at the lights, both indications that they noted the change. Notably the children never turned the lights off and left them off, they always turned them on again! One verbal student with ASD who visited the classroom commented that the lights had changed and said that he liked the new lighting. In order to consolidate these observations, we hope to invite more verbal students and adults with autism to comment on the new lighting. Unfortunately the new lighting failed to resolve the glare issues.

Laminate



The fourth phase of the Learning Environments research was the replacement of the glossy laminating paper with matt laminate for covering the visual resources used during lessons. Observations by classroom staff had indicated that the reflection from the lighting on the glossy laminate was hindering the students' ability to see their work, causing them to squint, and reducing their independence and engagement in the activity since staff were frequently having to reposition work so as to reduce the glare. A guide by the RNIB outlining factors which enable a book to be more accessible to individuals with visual impairments highlights the fact that a matt surface is preferable to glossy (RNIB, 1999). Since the introduction of the matt laminate, combined with the new lighting, staff have observed that the reflections on the students' work have noticeably reduced and the students are looking and engaging better in activities.

#### - The next step

The next modification to the physical environment in the Learning Environments research classroom is likely to be that of finding an alternative to the current independent work stations and group table. At present the group table is rectangular. As mentioned earlier, it has been noted that children with ASD have a preference for curvilinear designs, since these are easier to process and put less stress on proprioceptive dysfunction. There is also research showing that the circle is the first shape learnt, at around developmental age 3, and that as such it is the least stressful and most recognisable shape (Caine & Caine, 1991). Consequently, replacing other shapes in the learning environment with circles can reduce the stress and distraction induced by unnecessary processing and can consequently increase concentration and engagement. As such a new group table of curvilinear shape is in the process of being designed and it is hoped that this will be ready to be introduced into the research classroom in September 2007.

The current group table is also coated with a glossy polish, and staff have observed that the reflection on the table is a distraction to all the students, and one in particular has taken to constantly writing on the table in saliva, an activity which he does not undertake at his individual work station table which has a matt finish. Furthermore, at present some children in the classroom enjoy banging on the table due to the echoing noise it creates. This in turn can be both distracting and distressing for other children in the class due to the auditory dysfunction experienced by many of the children. It is hoped that utilising the correct materials to make the new group table will both reduce

the sound reverberation currently produced when the table is banged and eliminate the distraction of the glossy finish.

The students' independent work stations are currently created from an improvised combination of various mismatched and cluttered furniture. Staff have commented that as such the furniture itself can become a distraction at times, and thus the children would benefit from a more clean-cut and organised design. The work stations also utilise screens to minimise distractions, however these create health and safety risks. As such an alternative design is in the process of being developed, with the aim of replacing the existing work stations next academic term. It is also hoped that it will be possible to obtain classroom chairs which prevent the children from rocking / leaning back since at present this is a major distraction and also a health and safety risk when the children tip their chairs back so far they fall off. Suitable alternatives are currently being investigated to eliminate this risk and improve both the children's posture and engagement.

### **Pedagogy and Related Resources**

To date, many attempts have been made to support those with ASD within a classroom setting. One approach which has been widely and successfully used within both mainstream and special education classrooms is that of Treatment and Education of Autistic and related Communication-Handicapped Children (TEACCH) (Mesibov & Howley, 2003). TEACCH was originally developed by Eric Schopler throughout the 1970s (Marcus et al, 1977) and is an approach which incorporates the use of structured teaching based on visually mediated learning and the prosthetic structuring of the environment. Over the last 30 years it has become increasingly well recognised that many children with autism have a strong preference for visual instruction over verbal (McClimon, 2007). Hodgdon (1998) describes individuals with autism as being 90% visual learners and 10% auditory learners. Structured teaching utilises a combination of physical structure, schedules, work systems, routines and visual structure to support the person with autism to engage and learn as effectively as possible. Structured teaching also integrates many aspects of Alternative and Augmentative Communication (AAC) to assist those unable to communicate using speech. Structured teaching has been thoroughly researched and been found to be highly effective in assisting those with ASD (Mesibov, 1997; Panerai et al. 2002; Tissot & Evans, 2003). Furthermore, structured teaching is successfully used by the majority of children at Sunfield School and remains key to the successful engagement and learning of the children in the research classroom.

However, whilst structured teaching and AAC have been extremely successful in providing individuals with autism with an effective and practical means of communication by building on their visual strengths, they do not attempt to develop the pre-speech and speech skills notably weak or absent in those with autism (Lord & Schopler, 1994; Smith, 1996). One classroom-based approach which has been developed to address these needs of individuals who are still at very early stages of communication development is that of intensive interaction (Hewett, 1994). Intensive interaction is a relaxed, non-directive and responsive approach in which the learner leads and directs interactions and the teacher responds to and joins in the behaviour of the learner. The aim is that as interaction sequences are repeated, the fundamentals of communication are gradually rehearsed and learnt in a free-flowing manner. Studies



have shown that intensive interaction has been largely successful in enhancing the development of many individuals with ASD within a classroom setting (Nind, 1996 and 2003; Watson & Fisher, 1997).

As such, a further modification which is planned to be instigated in September 2007 is the introduction of intensive interaction as an option during choice time. Following the relocation of one child to another class, there is now a spare room available in the research classroom for choice time activities, and it is hoped that the children will benefit from the option of intensive interaction sessions within this setting. Intensive interaction training for all staff working in the research classroom is currently being arranged.

## **Staff**

The third element to be considered when developing a learning environment for children with profound ASD is that of the staff. Naturally it is essential that staff working with children with ASD have a sound knowledge base on autism and are experienced in working with them (Plimley, 2004). However, there also exists a further avenue to explore, which is that of the importance of the teacher-child interaction, and the crucial role that this can play in teaching children with ASD. There are a number of studies indicating that teacher style, and in particular high levels of teacher interaction, can positively influence the engagement of children with special needs (Mahoney & Wheedon, 1999; Malmkog & McDonnell, 1999). Thus integration of an approach such as intensive interaction into the classroom as outlined above may have significant benefits for engagement and learning.

A further avenue currently being explored is how best to obtain teachers' perspectives on their learning environments – what they consider to be most successful and what they would change given the opportunity. An interview schedule is in the process of being constructed to explore these ideas, with questions centring around the key themes of teaching pedagogy / resources, physical environment and teaching staff.

## **Looking back and Moving forwards**

It has been a busy year for the Learning Environments research team, and observations to date indicate that the new daylight lighting and matt laminate are proving highly effective in improving children's engagement during lessons. Investigations continue to find a more robust and bite-proof chair covering, and although the Leca furniture did not remain within the classroom its trial provided a useful springboard for future furniture design. Exciting times lie ahead, with the eagerly anticipated introduction of the new classroom group table, independent work stations and chairs in the new academic year. Once all the teaching staff have completed training in intensive interaction this will be integrated as an option during the students' choice time. Interviews to gain teachers' perspectives on their current learning environments are planned for September 2007. Many thanks to all those involved in the Learning Environments research for their support and hard work over the past year.



## Bibliography

Adams, D. (2005) 'Organic Functionalism: An Important Principle of the Visual Arts in Waldorf School Crafts and Architecture'

The Research Institute for Waldorf Education, Oct 2005, Vol. 10, No. 1

Baranek, G.T., (2002) 'Efficacy of sensory and motor interventions in children with autism'

Journal of Autism and Developmental Disorders, 32(5), 397-422

Beaver, C. (2003) 'Breaking the Mould'

Communication, Autumn

Beaver, C. (2006) 'Designing Environments for children and adults with ASD'

Presented to the International Conference on autism, Cape Town (22.08.06)

Bogdashina, O. (2003). 'Sensory Perceptual Issues in Autism and Asperger Syndrome: Different Sensory Experiences – Different Perceptual Worlds.'

London: Jessica Kingsley Publishers.

Burn, R. (2005) 'Partly Heard Song'

<http://www.hhrc.rca.ac.uk/events/include/2005/proceedings/pdf/burnrob.pdf> (accessed 01.12.06)

Caine, R. & Caine, G. (1991) 'Making Connections: Teaching and the Human Brain'

Addison Wesley, New York

Dunn, W., Saiter, J., Rinner, L. (2002) 'Aspergers syndrome and sensory processing'

Focus on Autism and other Developmental Disorders, 17(3), 172-178

Grandin, T. (1995) 'Thinking in Pictures'

New York: Vintage

Hewett (1994) Understanding and writing a methodology of Intensive Interaction – teaching pre-speech communication abilities to learners with severe learning difficulties: a naturalistic inquiry using qualitative evaluation methods Ph.D Thesis, Cambridge Institute of Education.

Hodgdon, L. (1998) Visual Strategies for Improving Communication : Practical

Supports for School & Home

Querk Roberts Publishing

Humphreys, S. (2005) 'Autism and Architecture'

[www.autismlondon.org.uk/pdf-files/bulletin\\_feb-mar\\_2005](http://www.autismlondon.org.uk/pdf-files/bulletin_feb-mar_2005) (accessed 17.04.07)

Irlen, H. (1991) 'Reading by the colours: overcoming dyslexia and other reading disabilities through the Irlen method'

New York: Avery

Lawson, W. (2000) 'A life through glass'

London: JKP

Lord, C. & Schopler, E. (1994) TEACCH services for preschool children In S. Harris and J. Handelman (Eds) *Preschool education programs for children with autism* 87-106 Austin, TX: Pro-Ed

Mahoney, G. & Wheeden, C.A. (1999) The effect of teacher style on interactive engagement of preschool-aged children with special learning needs *Early childhood research quarterly* 14 (1), 51-68

Malmskog, S., McDonnell, A.P. (1999) Teacher-mediated facilitation of engagement by children with developmental delays in inclusive preschools *Topics in Early childhood special education* 19(4), 203-216

Marcus, L., Semrau, L., Schopler, E. (1977) 'Division TEACCH: Towards a statewide network of public school services for the autistic child and his family' Co-ordinating office for regional resource centres August 34-44 Washington DC

McCLimon, D. 'Visual strategies leverage autism's strengths to improve lives' <http://www.sandbox-learning.com/FileLib/AutismAwarenessMonth.pdf> accessed 17.04.07

Mesibov, G. (1997) 'Formal and informal measures of the effectiveness of the TEACCH programme' *Autism*, 1 (1), 25-35

Mesibov, G. & Howley, M. (2003) 'Accessing the Curriculum for Pupils with Autistic Spectrum Disorders: Using the TEACCH Programme to Help Inclusion.' London: David Fulton

Nind, M. (1996) 'Efficacy of Intensive Interaction: developing sociability and communication in people with severe and complex learning difficulties using an approach based on caregiver-infant interaction' *European Journal of Special Needs Education*, 11 (1), 48-66.

Nind, M. (2003) Enhancing the communication learning environment of an early years unit through action research *Educational Action Research* 11 (3), 347-63.

Panerai, S., Ferrante, L., Zingale, M. (2002) 'Benefits of the Treatment and Education of Autistic and Communication Handicapped Children (TEACCH) programme as compared with a non-specific approach' *Journal of Intellectual Disability Research* 46 (4), 318-327

Pauli, D. (2004) 'Engaging the feeling and will of children with autism through the medium of colour' PhD Thesis, University of Birmingham

Pauli, D. (2006) 'Contact through colour' *Special Children*, June/July pp 30-33

Pauli, D. (2007) 'Reconnecting thinking, feeling and willing.'

In Carpenter, B & Egerton, J (Eds) *New horizons in special education: Evidence based practice in action*  
Sunfield, Clent

Plimley, L. (2004) 'Analysis of a student task to create an autism friendly living environment'  
*Good Autism Practice*, 5 (2), 35-41

RNIB E&E, *Clearly a Better Read* (1999)  
RNIB Corp Publishing

Smith, T. (1996). Are other treatments effective? In C. Maurice, G. Green, & S. C. Luce (Eds.), *Behavioral intervention for young children with autism: A manual for parents and professionals* 45-59 Austin, TX: PRO-ED

Steiner, R. (1958) 'A social basis for primary and secondary education.'  
College of Teachers Michael Hall, reprinted by Waldorf Institute Adelphi University  
1975

Tissot and Evans (2003) 'Visual teaching strategies for children with autism'  
*Early Child Development and Care*, 173 (4), 425-433

Watson, J. and Fisher A. (1997) Evaluating the effectiveness of Intensive Interactive teaching with pupils with profound and complex learning difficulties *British Journal of Special Education* 24 (2), 80-7

Whitehurst, T. (2006) 'The impact of building design on children with autistic spectrum disorders'  
*Good Autism Practice*, 7(1),

Whitehurst, T. (2006) 'Evaluation of features specific to an ASD designed living accomodation'  
Sunfield Research Institute Publication

Williams, D. (1992) 'Nobody, Nowhere'  
London: Random House

Williams, D. (1995) 'Somebody, Somewhere'  
London: Random House