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Studio teaching experiments – spatial transitioning for autism schools

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Studio
teaching
experiments

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Abstract

Purpose – The purpose of this paper is to evaluate a teaching model involving an experimental studio project for first-year interior architecture university students.

Design/methodology/approach – Content, process, teaching style and feedback are examined in a project, run over five years, concerning transitioning between environments for people with autism in an attempt to advance design of autism schools. Research methodology, teaching model, outcomes and group dynamics are critiqued.

Findings – Feedback from experienced autism-specific teachers across eight case study schools raise recurring issues framing a series of design problems navigated by students. The teaching model enhances student exploration of how sensory processing difficulties, through spatial transitioning strategies, might be approached, whilst furthering their specialist knowledge as future designers of inclusive spaces.

Research limitations/implications – Each transitioning platform requires deeper research to form a realistic interior typology. A further project to install and evaluate specific “transitioning insertions” into circulation spaces of an autism school is proposed for future research.

Practical implications – The identification of this teaching model illustrates how to embed design for autism in the university curriculum.

Social implications – The project brief helps address the National Autistic Society’s public autism awareness campaign “Too Much Information” highlighting anxieties that “unexpected change” causes. Effective design of transitioning spaces can help people with autism to cope with their environment, reducing behaviours and improving learning.

Originality/value – The creation of the “Co-specialist ASD-educator model” will be of value to universities. “Ten Spatial Transitioning Platforms” were uncovered relating to Transitions. This will be of importance to autism researchers and eventually design practitioners.

Keywords Sensory, Spatial, Autism schools, Educator, Studio teaching, Transitioning.

Paper type Research paper.

1. Introduction

Design influence on neuro-typical behaviours is well recognised (Cash *et al.*, 2017), but less recognised is influence within autism environments. SEN educators adopt varied teaching approaches, for example, TEACCH, Intensive Interaction and ABA, but the spaces in which they teach do not always support learning processes or behavioural issues (Emmons and Anderson, 2006). This studio project challenges design students to problem-find, problem-solve (Lawson, 1980) and dovetail spatial design interventions with such processes and issues. By designing a responsive “enabling environment” (Khare and Mullick, 2009, p. 45) which assists the children in coping with their interior setting, learning opportunity and inclusivity improve. The project interpretations intersect with existing principles concerning transition

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zones, spatial sequencing and acoustic issues (Mostafa, 2018, p. 310), yet introduce new viewpoints and alternative potential design strategies.

The project involved 22 students, this paper referencing the work of 9 students, who were particularly influenced by transitioning issues; 2 are discussed in more detail.

A pilot project, sited adjacent to Leeds Bridge, unlike the current project, involved a child-centred approach based on 1:1 student to child information gathering (this aspect and methodology being described in more detail in a previous paper (Love, 2018).

Implementing learning's from the pilot, the current project involves more specific project briefs, two case study visits each year with a tutor, who is also the author, and information gathering and feedback from autism teachers, from schools in North, South and West Yorkshire, and tutor. The teachers raise recurring issues: generalisation skills, anxiety levels, ritualistic behaviours, delayed perception; sensory overload, de-sensitisation, proprioception and self-regulation. These themes frame a series of design problems navigated by students. Transitioning is utilised as the main vehicle driving student design ideas. Throughout the part live, part studio-based, project, the word "transitioning" is interpreted as relating to moving through different spaces, but also re-interpreted at times, beyond its traditional use in autism.

Implicit in the pedagogy is the successful use of the "Co-specialist ASD-educator model", which utilises a two-pronged collaborative approach between a university design tutor with a working knowledge of autism, and autism expert school teachers.

Involvement of the citizen as "co-creator" (Sara and Jones, 2018, p. 326) in community projects is challenging to manifest when accessing information from children with autism. Two main issues dominate: communicating effectively and the outcome that a different response is recorded for each and every child with autism (www.autism.org.uk/about/strategies.aspx). However, findings can be highly valuable as evidenced in the pilot (Love, 2018). The current project explores an alternative, sourcing user issues first-hand from experienced autism teachers and autism schools, without direct communication with pupils. People with autism experience the world so differently (Bogdashina, 2003) from neurologically typical people that students quickly learn they cannot respond in the same way as to a user without autism. Pre-existing ideas demand to be re-thought and re-interpreted.

2. Research methodology

2.1 *The co-specialist ASD – educator model*

The recipe for the teaching model, developed and applied to this project, contains two main educator ingredients:

- (1) a design tutor with a working knowledge of autism; and
- (2) direct communication with school teachers who are experts in autism.

And four main design ingredients, embedded in the design process, focusing on experiential learning (Kolb, 2005):

- (1) pertinent autism-specific case studies, visited first-hand;
- (2) identifying behavioural issues within autism schools which directly inform ideas throughout the design process;
- (3) an emphasis on conceptualisation, driven by spatial transitioning and hyper- and/or hypo-sensitivities to sensory stimuli, primarily communicated through model making; and
- (4) feedforward and feedback from tutor and teacher.

All tutored in an experimental studio setting (Maturana, 2010).

3. Conceptions and parameters of the studio/project

3.1 *Inspiration*

An early tutor briefing provides the Thinking in Pictures film (Temple Grandin, 2010) to set the scene and allow for a period of gestation (Fisher and Williams, 2004) prior to the formal start of the project. Fast track tutor delivery follows, on current autism research, specifically spatial transitioning issues. This propels students into the subject, to keep on task, as it is too large a subject area for students to research from scratch, at first year level.

Once past the initial grounding, students are encouraged to take active learning (Salama, 2015) surrounding big ideas and concepts, rather than the completely realistic and fully functional, discouraging predictable outcomes. Practice parameters are put in place to encourage grappling with known issues: knowledge that the government guidelines (Architects and Building Branch, Department for Education, 2015) are still limited for autism schools, and the existing building is Grade II listed. Responses to this wide, yet a targeted approach, are then negotiated at small group tutorials.

3.2 *Identification of individual briefs*

The tutor encourages each student to find a different brief direction, under the autism school brief umbrella, so that widening research and expertise can be shared at tutorials and pin-ups, with individual approaches developing more effectively. Enough tutor direction is provided so that students avoid going off at a tangent, but retain sufficient autonomy to encourage ownership.

3.3 *Inspiration for briefs*

Four main sources of brief are selected, to discourage procrastination, to stay on programme, yet to allow “discovery” (MacDermott *et al.*, 2012, p. 77):

- (1) Choosing sessions with ASD children (pilot project). Pilot briefs, to design a school for autism inspired by children, were too wide and, in the current project, shifted to a case study focus enabling more containable specialist life-skill briefs.
- (2) Autism quotes, for example, “Give time, whenever possible, to acclimatise to change and don’t suddenly spring things onto the person” (Lawson, 2001, p. 168), re-interpreted as giving time whilst travelling through spaces, inspired an art and felt making school.
- (3) Case study visits, for example, the hydrotherapy pool at Chellow Heights School inspired a water-based, pre-swimming school.
- (4) Research into shortage of provision.

3.4 *Case study research*

This involves two diverse case study visits pre-organised by the tutor to local SEN schools each year of the project, to fast track the sourcing of design issues and to emulate design practice. The expert ASD teachers showing the small group of students around the schools, start to take on the role of client, exposing students to first-hand research on behavioural and spatial transitioning issues. The tutor takes the lead with questioning the teacher, but gradually this task shifts to students, who learn to think on their feet, raising issues pertinent to their emerging briefs, deepening and widening their knowledge base (Kolb, 2005). This encourages on-the-spot critical thinking; students must evaluate quickly what is important to their work and why.

By visiting two schools each year (totalling eight over this project timescale), the tutor gains an over view of each environment to ascertain which are more effective as case studies

Spatial transitioning for autism schools

for subsequent years. Decisions are based on the depth of knowledge of the teacher, and the quality of provision of ASD spaces.

The following Annotated photographs (Plates 1–3) communicate visually the effectiveness of live case study visits at informing students of current transitioning strategies and issues.

Richmond Hill School Rainbow Base stands out as an innovator in transitional design ideas, demonstrating to students that key planning moves can be affected by concept. For example, fundamental to its original design, the Rainbow Base autism unit is located at the centre, with the large mainstream school wrapped around, creating a symbiotic relationship with unexpected learning opportunities for the ASD children and, on occasion, reverse inclusion.

Rainbow Base consists of two “learning corridors”, free-flow learning environments for transitioning (Mara *et al.*, 2015) allowing choice of activity. Students learn that materiality and detail is imperative in design, for example, on entering at one end, the carpet is dark grey, and, within a wider protected open lobby, there is a clear line or transition (Plate 3, bottom right) to a light grey ribbed carpet. Those with transitioning difficulties practise stepping over this threshold line. Some children find the joints in the light grey carpet tiles are too obvious and struggle crossing them, getting stuck in the space. At one end is a glowing fish tank which acts as a motivator to encourage pupils to focus and move forward.

3.5 Application of design precedent to a project

As part of the design research report, students are asked to source exemplar, sensory related, design precedent to inspire and inform their work. Strong examples include Wallbot Otto Ng’s intelligent kinetic movable wall, capable of reconfiguring itself to

Plate 1.
Bents Green Specialist
Secondary School,
Sheffield (left and
centre) and West
Oaks – Boston Spa
Learning – SEN
Specialist School,
Boston Spa (right)



Notes: Left and centre: a mix of large open spaces and small transitional protected spaces externally to give the pupils options; right: an external canopy acts as transitional space for outside learning

Source: Author

Plate 2.
The Lighthouse
School, Leeds



Notes: Left: arts and crafts existing veranda, acts as a transitioning space for play; centre: the slow route from playground to school building; right: the fast track route straight into the classroom

Source: Author



Notes: Top left: colour highlighting purpose; top centre: sensory sculpture; top right: classroom tent by door to help with transitioning; bottom left: flexible alcove spaces convert for specific purposes depending on need, e.g. calm rooms; bottom centre left: flag-posted classroom door; bottom centre right: hexagon pause space; bottom right: learning corridor with transitional carpet line

Source: Author

Studio teaching experiments

Plate 3.

Chellow Heights Special School, Bradford (first Six images) and Richmond Hill School, Rainbow Base, Leeds (bottom right)

respond to the behaviour of the users in real time (el-Khoury *et al.*, 2012). Experience has established that students avoid lifting any precedent, but instead use discretion to select those they can reinterpret.

3.6 Conceptualisation

Important aspects of first-year learning include how to explore design concepts, fundamental abstract ideas, which drive projects forward, inspiring experimentation and stimulating creativity.

3.7 Small concept models

The tutor introduces the idea of teaching concept through specific quotes from autism experts as a means of identifying a problem and exploring potential solutions, initially through concept modelling (Plate 4), to convert early research ideas into three-dimensional forms. Often the most challenging stage in design process, this involves abstract thought, a leap of imagination and lateral thinking (de Bono, 1967). The initial developments from one student include Ball-Nogue



Source: Author

Plate 4.
Student A: shadow canopies become external classrooms, changing colour with activity to provide a visual clue, rather like a silent bell

inspired shadow canopies, swapping the Mylar light reflective film (Moskow and Linn, 2010) to Irlen filters to reduce contrast (Lawson, 2000) and decreasing the petal count to simplify form and lessen detail (Scott, 2009). This tests the morphing of explicit knowledge, surrounding current thinking on autism and inspiration from design precedent, with tacit knowledge of turning ideas into 3D form. In this case the forms are less abstract, moving down the abstract-functional continuum, to early functional development.

3.8 Sensory storytelling

Teaching a design narrative is well embedded in many spatial design courses (MacDermott *et al.*, 2012). Seen through the eyes of the autistic user, it is impossible to interpret how a spatial story, told whilst moving through the interior, could be visualised by each ASD child. However, on this project students are taught that sensory issues surrounding hyper-sensitivity and hypo-sensitivity (Bogdashina, 2003) in autism can inspire design by creating a sensory story through each space. This approach also indirectly sparks ideas surrounding choices of materiality.

4. Scope of issues examined in studio

4.1 Spatial transitioning

Students are asked to pay attention to arrival, thresholds, vistas and routes through, above and below in all interior design projects. This autism brief demands these considerations to a heightened degree, as the impact on the children to unexpected change can cause distress and major meltdowns (www.autism.org.uk/about/behaviour/meltdowns.aspx). They are taught that the designer holds a major social responsibility and a need to understand fully how to respond to the users of their design.

4.2 Design constraints

These are taught as opportunities, encouraging grappling with problems, and a heuristic approach to learning, to produce unexpectedly innovative outcomes. Many diverse examples from past students, at each stage in the design process, are presented, as reassurance. That there are no right or wrong responses emphasised, as long as knowledge surrounding sensory issues and autism are carefully considered.

4.3 Visualcy at tutorials

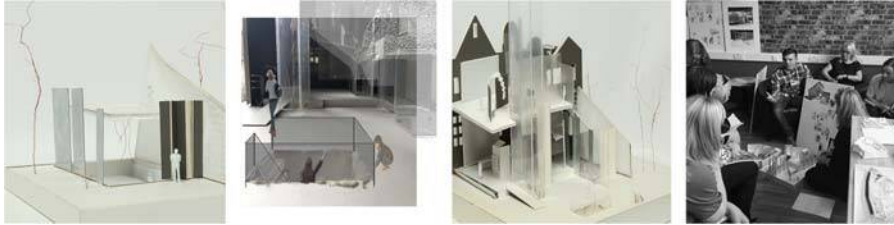
The shift to interacting regularly with digital images means that the evaluation of image for students can be more sophisticated. Tutorials offer the opportunity to talk through and evaluate image on a deeper level, examining meaning and how they can inspire.

4.4 Design development

How to tackle moving the concepts and developed ideas into the building is discussed, optionally breaking down the existing building into smaller more manageable chunks using 1:50 mini-models (Plate 5, left).

4.5 Materiality inspired by context

Students are encouraged to relate materials choice to transitioning. The approach of one student includes a building skin constructed from diaphanous polycarbonate sheets and borrowed shadows cast from the surrounding trees (Plate 5, centre left). This exploits materiality as camouflage, as a means of breaking the boundary of external walls, reducing the threshold for transition.



Notes: Student B: left: 1:50 mini-model of sunken entrance to help with acoustics; centre left: borrowed shadows; centre right: complete model; right: SEN student presenting to the SEN teachers at Richmond Hill School

Source: Author

Studio teaching experiments

Plate 5.
Student work

4.6 Existing buildings

A more architectural response from another student, with the unlisted rear building elevation (Plate 5, centre right), results in discussions on scale of approach, and the introduction of small appropriate interventions within interior architecture practice.

5. Group work dynamics

5.1 Small group tutorials (4–5 students)

Studio sessions present an ideal setting for one-to-one discussion of potential specialist briefs based on the individual's research. Also facilitated is the opportunity to open-up discussion to the group, learning from peers, and gently encouraging the development of verbal communication skills in an unthreatening setting. Each student presents slightly different areas of interest and inspiration surrounding autism, which is then nurtured and supported to formulate a clear way forward on a bi-weekly basis.

5.2 Special insight from a SEN university student, in a tutorial group

A valuable addition to the project was a design student who communicates his ideas through strong freehand drawing skills (Plate 5, right) and is profoundly deaf. In response, the functioning of the group alters, with a sign language interpreter always present, and a requirement for clarity in providing direction and instruction. Students gain an insight into another special need and related perceptions of space.

5.3 The site combine: emotive site analysis (paired groups)

At the start of the project, a site-specific mini-brief is set, inspired by Rauschenberg's combine constructions, encouraging the students to investigate the overlap between 2D image and 3D non-traditional forms when they are changed by context. The pairing bounce ideas off each other and jointly produce an assemblage inspired by emotive analysis of site, referencing past histories of the building. This exposes them to finding surprises as inspiration and making emotional reactions to site stimuli.

5.4 Spirit of the interior (paired groups)

Running at the same time as the combine brief, this mini-brief is set in response to the Old Leeds Library which is also the project building for some students. The derelict site and boarded-up interior mean that an alternative approach to understanding the existing interior is required. An online catalogue of interior photographs is available from original black and white images to many recordings of the building in a state of decay. Working as a

team, the students jointly find, share, evaluate and create an atmospheric collage of the spaces, helping each other understand the qualities of space before being able to create their own proposals.

5.5 1:1 Tutorials

One- or two-hour long sessions, occurring towards the end of the project, designed to grapple with more complex issues surrounding spatial relationships and an element of emerging detail. These provide the opportunity for the tutor to have a deeper and wider overview of individual inputs, encouraging vertical thinking (de Bono, 1967).

6. Diversity and exemplars

Two diverse student outputs are examined: the first by a student who thinks laterally and is able to communicate through strong 3D model-making skills; the second is more pragmatic which can be seen through brief selection and research into sustainability.

6.1 Student C

Inspiration: case study visit to Henshaw's Specialist College, Harrogate, and the desire to induce normality within the environment, alongside an ambition to train pupils in a craft, a job for the future.

Individual brief: a craft and design college for autism (Plate 6, bottom centre), using recyclable furniture, offering choices of hard materials, such as timber, and soft materials for upholstery.

Key concepts: transitioning and borrowed thresholds. The hexagon is the dominant form, born out of desire for an inclusive community feel yet more practical spatially than a pure circle. All interior hexagon-shaped workshops are set away from the main external walls, often tessellated, to be familiar and easy to read. Workshop panelling contains a section of exterior skin peeled away to inform pupils about timber construction and to help make sense of the whole, using the building as a teaching tool.

The whole interior is a journey through a large, continuous, clearly defined, open ramp, with a lift as a faster alternative (Plate 6, top left and right). Inspiration includes the Japanese tradition of shakkaei, or borrowed scenery, from a lecture on Enric Miralles' site-specific Igualada cemetery and earthwork, outside Barcelona, which merges manmade structure with landscape. Two main design solutions help reduce the threshold between building and surrounding cityscape.

The first major issue is the potentially overstimulating (Heller, 2002) view from the first-floor front windows across the A64(M), as pupils approach up the ramp (Plate 6, bottom left). A concertina zig-zag glass lining set into the curved window-reveal with frosted glass angles initially obscures the outside view. The view is gradually revealed as visitors move up to and across the window, the reverse angle containing clear glass.

The second is to reduce the threshold with the sky. Acoustic suspended cloud hoods are set beneath a glazed roof light, forming a borrowed sky. The hoods reduce the ceiling height and reflect natural light onto the work benches below (Plate 6, top centre).

6.2 Student D

Inspiration: Passivhaus naturally ventilated approach, witnessed when visiting Richmond Hill School. The building is viewed as a machine both to control the elements and teach children about a love of nature (Kedar, 2012) in a regulated interior environment.

Individual brief: a nature-based activity centre for young children with autism (Plate 7, right).

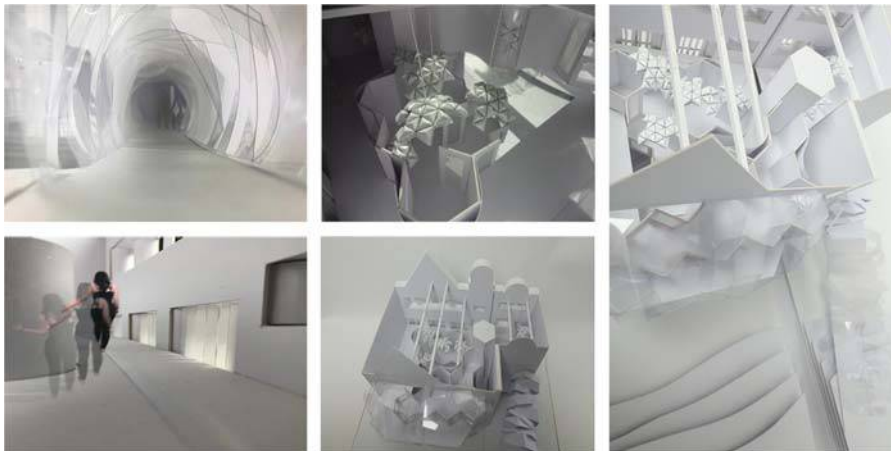
Key concepts: transitioning, sensory machine and sinking. The whistling prevailing wind during the site visit prompted the insertion of roof wind catchers, penetrating the interior, creating a series of playful, interactive, sensory spaces.

Rain is captured in a roof trough, redirected using gravity-led pinball-style grooves, down the side of a triangular glass rain-box. Children can choose to feel and hear rain vibration, inspired by the sensory room at Henshaw's, when travelling down the staircase edge, from the security of the inside. A series of three light tunnels, with varying levels of transparency, disperse different natural light qualities and fractions into the interior. Children can interact with the adjustable flap on catchers to self-regulate the amount of light into adjacent space. Experiential learning is encouraged as pupils try to work out the light's source.

An external skyspace is excavated (Plate 7, left and centre) and sunk into the rear playground, referencing the location of the former adjoining Victorian bathhouse. A ramp with a slow inclining tunnel allows for incremental moves to transition down, into an underground space, lined with Acoustiblok®, with the focus of a light at the end, the sky. Children can sit, recline or lie back and look up through the ceiling at a square of sky. They can observe constant sky and changing weather, in a safe, acoustically controlled, sensory environment.

7. Discourse and discussions through pin-ups and reviews

The tutor structures sessions so that students know how to present their work, but also directly asks questions to individuals so that attention is maintained, autism research is discussed further and the early stages of peer criticism are explored.



Source: Author

Plate 6.
Student C: (top left) transition entrance tunnel; (top centre) acoustic cloud canopies; (right) transition balcony; (bottom left) window inserts; (bottom centre) overall model



Source: Author

Plate 7.
Student D: (left) skyspace in section; (centre) skyspace viewfinder; (right) lightbox table displaying rubbings

Discussion is not solely about an aesthetic and functional appreciation of sculpting space, form and line, but also a more challenging understanding of experimenting with flexibility of purpose and ASD teaching strategy within the spaces; reduced form is employed, applying a low arousal colour palette and materiality choice, all relating to the changing behaviour and hyper or hypo-sensitivity needs of the children.

Students learn about uncertainty and that design is a responsive profession. They meet experts and tutors who disagree with each other and who are also learners. They learn that discussions surrounding several theories can be held at one time. Autism research is shifting and changing continuously so what they are responding to now, may alter in the near future. Autism has been misunderstood for years (Kanner, 1943) and this no doubt continues to be the case as experts try and unravel the autistic mind.

8. Outcomes and assessment

The project evidence that, although students typically struggle with the concept development, by connecting with the users of spaces and making purposeful associations through research, sourcing concepts can be more easily accessed.

The making of 1:50 models of parts of the building successfully reduces the impact of having to consider the whole building as one, at the start of the project, which is a complex task for first-year students. It also encourages looking into the detail of how each space functions.

An emphasis on hyper and hypo-sensitivities directly inspires students to respond to materiality and the user, focusing the student on producing 1:5 detail models of specific transitioning spaces.

Students are encouraged to explore creative spatial alternatives, while recognising current recommendations for autism environments. Students learn to be human problem focused; a balancing act is at play between triggering sensory overload, so hampering learning, and carefully advancing design for autism. Not only is tacit knowledge found in their research into autism, but also implicit knowledge as the design process gathers speed and ideas surrounding transitioning are generated and synthesised.

Indicative performance assessment halfway through the module proves an unhelpful measure of development as the design process cannot be truly assessed until the end. Arbitrary grades either provide the student with too much praise, or too little, neither is useful at this point.

Final assessment is synoptic at the end of the double module with learning outcomes encompassing: research, critical analysis, context; creative processes; communication; design proposal; management, responsibility and professionalism. The autism project responds effectively to these requirements with the largest share of students attaining the highest-grade category.

9. Results and reflections

9.1 *Conceptions and parameters of the studio/project*

Surrealist principals: juxtaposition of two or more diverse inspirations is encouraged throughout, to spark the unexpected. Exploitation of ideas from the mini-site inspired briefs, concepts, case studies, autism research and studio lecture series, all prepare an environment for the initiation of re-imagining the autism brief.

SEN student: to further the teaching of this deaf student, the tutors set up a series of sensory-related Pinterest design precedent folders as visual explanations of incorporating concept into design. This provision also became useful for other members of the year group.

External examiner feedback: "Conceptual thinking is notoriously difficult to teach, and notions of 'the concept' often plague design courses; students are often unable to grasp what a concept is or how to generate one. That conceptual thinking is so firmly embedded in this program is no mean achievement".

9.2 *Scope of issues examined in studio*

Students witness that building spatial strategies into design (Khare and Mullick, 2009) provides alternatives for handling autism-related behaviours. It also opens their minds to realizing that all humans have some degree of sensory-related issue, of one kind or another; if all design is autism considered, then the wider population benefits.

The project opens up larger debate with students concerning resource designers and architects devote to designing for the physically disabled, compared to those with sensory impairments and autism.

Each ASD case study school provides different provision depending on demand, e.g. age and level of autism need. This affects direction of student briefs, so briefs shift and change accordingly each time the project is run. Fitting choice of case studies in subsequent years prevents the project stagnating.

9.3 *Group work dynamics*

Working in pairs helps bond the groups, students tend to be more ambitious with the outcome and more can be achieved in less time than working alone. There can be issues if pairs are not willing to work together closely to make sure the outcome looks integrated, as if it is created by one hand. However, there comes a time when the student is better working alone, taking responsibility and moving the design in a personal direction to reflect individuality.

The combination of team work and individual work is more powerful (Lawson, 1980) offering the chance to discuss and debate on one hand, and autonomy and control on the other.

9.4 *Diversity and exemplars*

Tutor reflection on two student designs:

- (1) Student A's work highlights the benefit of teaching the autism project alongside the generic studio lecture series, as the tutor's lecture on Enric Miralles triggered divergent, adventurous thinking (Fisher, 2003, p. 13) resulting in an unexpected connection between shakkaei and spatial thresholds within autism schools. Her preference for visual learning and fastidious approach to 3D model making means that her design proposals are communicated effectively. Her design research report was less successful as the student prefers to learn through making, evidencing that a balance of requirements favours a student.
- (2) Student B's brief benefits from analysing the strengths and weaknesses of the previous project outcomes in studio. The tutor exploited her preference for verbal learning providing her with targeted written referencing surrounding her sustainability research, which has driven a thoughtful result. The former use of the building inspires the concept of sinking spaces to assist with acoustics, and illustrates that site analysis can be inspirational. This student is less confident at model making; therefore, her ideas are communicated through her verbal presentation skills, her research sheets and her developing Photoshop skills. This taught the group that as long as their designs are communicated effectively, there are alternative means.

In the final year of the project, the student group was the strongest. This enabled the brief to be taken disproportionately further, as the bar was set higher, motivation was strong and a competitive, yet supportive, environment established.

Appropriate tutor-created Pinterest folders can benefit the whole year group such as, in this case, two sustainability related folders on green walls and light and wind catchers.

Tutors become more skilled in advising on autism research as the project matures, triggering diverse thinking and enhancing flexibility with the brief so that a student can take on more challenging research, if their work takes a particular direction.

9.5 Discourse and discussions through pin-ups and reviews

Face-to-face, peer-to-peer discourse can be overly positive and confidence boosting at this beginning level; however, as the project runs, students start to make more constructive suggestions for improvement. These interactions provide opportunity for students to recognise and challenge assumptions surrounding autism, first with the tutor, latterly with their peers as their understanding grows, and finally with the autism teachers.

Discourse at pin up stage on pilot project (ASD child centred). Students learn that constructive tutor criticism moves their work forward, for example:

- Student A (Plate 4), undertook some strong concept and development models, ideal to present to children, being visually stimulating and easy to access. However, the number of forms and changes in colours are perhaps too numerous in variety. The ability to shut off all colours, bar one, would be necessary to avoid overwhelming pupils.
- Student E (Plate 8), the level of flexibility in the tapering spaces allows for spatial diversity; however, it could allow too much change (Henry, 2011) and cause anxiety for some students. The option to cut into a tapering space with a simple, fixed contained volume would provide less confusion.

Recommendation from pilot project. The opportunity for interaction with children provides students with knowledge of diversity within autism and first-hand, real issues to be incorporated into designs. However, it became apparent that this generic brief for a school for autism is too wide for a small building, and, the following year, the brief was restricted to design of specialist life skills-based autism schools or colleges.

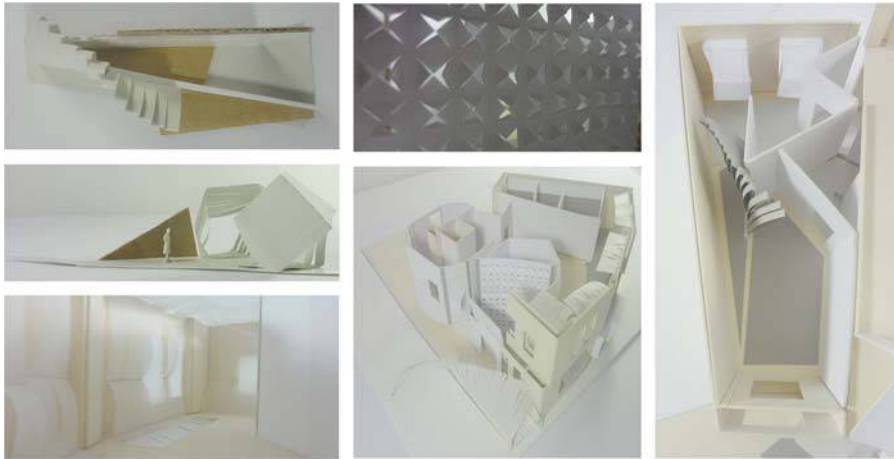
Client/ASD teacher discussions at final review stage on project (Case study centred). The opportunity for students to have their voices heard beyond the studio and present their work in front of a “client” enables learning to take on board constructive criticism, argue their case in an exposed situation, and take on responsibility for their judgements (Moon, 2008). In this situation it also provides students with further depth of knowledge into design for autism, confirming that owing to the richness of research, their design work is valid and credible. It also teaches the importance of continual client communication, to find out the full extent of needs:

- Teachers commented on the ease of understanding the design proposals as they were primarily through 2D visual and 3D models, for example, (Plate 9).
- The differing opinion of feedback from experts illustrates to students that more than one theory or opinion can be held at any one time. For example, one teacher identified behaviours when transitioning between spaces as the greatest issue in school, requiring multiple and time-consuming strategies. A view exists that school should reflect the real world, with no adjustment for pupils. In contrast, her view was that design to reduce transitioning time and so assist learning, the primary aim of a school, should be prioritised, although it is very dependent on the individual child, so flexibility of space is paramount.

Plate 8.
Student E: (left) folding ceiling; (centre) pivoting folding wall and cantilevered balconies to create outside learning spaces; (right) sliced rear elevation to attract natural light



Source: Author



Notes: Top left and middle left: elongated concept models, plan and elevation; bottom left: diffused light coverings over windows with cut out floor lights under, to reflect light into the darker space below; top centre: detail of felt wall with glimpses of the spaces beyond; bottom centre: overall 1:50 model with external canopy; right: spaces slowly flow into each other at the threshold

Source: Author

Plate 9.
Student F

- Much time is spent with pupils who have ritualistic behaviours and go back and forth between spaces, so to look back, without having to go back (Plate 9, right), is ideal, as facilitated by the elongated circulation and slots in walls.
- Utilising “transitioning” as concept throughout the design process inspires many creative design moves, for example, a cut in a felt wall is unlike a door (Plate 9, top middle), it can be a slow reveal, a slice into a space which can then be lifted, or turned, rather like a page in a book. This allows control over view, the amount of light the pupil can accept, at their own pace. The teacher thought that in theory the acoustic use of felt is welcome, although may not be resilient enough. Some pupils would investigate such an attractive element resulting in potential damage. However, the neutral colour palette throughout the interior was thought to be highly appropriate.
- One school was working towards NAS accreditation, with original advice advocating low arousal spaces, but newer advice suggesting desensitising pupils. The teacher considered that time is required to get to know each individual new pupil. Some have fewer sensory needs, coping with de-sensitisation strategies, but some may take years or do not respond to de-sensitisation, so spaces must accommodate this diversity.
- The Speech and Language Therapist (SLT) reported strong use of alternative soft textures, as many pupils are both hypo- and hyper-sensitive on the same day, in the same lesson. The opportunity to dampen and deaden the sound provides a much richer learning experience.
- Self-regulation is fundamental to teaching strategy, so the use by children of music and light, to regulate themselves, is welcome. The optional choice at entrance between two contrasting music routes, one for hyper-sensitivity and one for hypo-sensitivity (Plate 10, bottom left), is a strong idea and the first step to enable pupils to manage themselves.

Spatial transitioning for autism schools

The teachers normally undertake a series of strategies to assess how children are feeling, but it is helpful that pupils can demonstrate this through choice.

- The teachers liked the opportunity to trap the changing weather (Plate 10, bottom left), self-regulating the intensity so that children can participate in creating their environment through music.
- The teachers appreciated the flow of water leading through the space (Plate 10, top left, bottom centre, right), although water safety would be a factor to be addressed, as would the fact some children change quickly from hypo- to hyper-sensitive. Children can learn how water interacts with gravity and explore emotions with far greater engagement and fluidity than offered by a water tray. All spaces facilitate learning, providing room for physical activity and gross motor movement.
- One teacher was concerned with the springing floor in the general circulation (Plate 11, right); she thought that some children could become obsessed with this and that it should be restricted. The flexibility of LEGO® (LeGoff *et al.*, 2014) pod size (Plate 11, left and centre) was appropriate and suitable for each individual child, helping them generalise and transition through options. In a similar design, encompassing a contained bouncing corridor, the SLT liked the idea of desensitising using the environment to teach acceptance that a space moves and has unpredictability; the child can experiment and explore within a smaller, safer space, transferring and generalising the experience.

9.6 Outcomes and assessment

All 22 students showed capacity to process and assimilate, demonstrating creative insight and critical inquiry (Salama, 2015) and to apply a high level of research surrounding

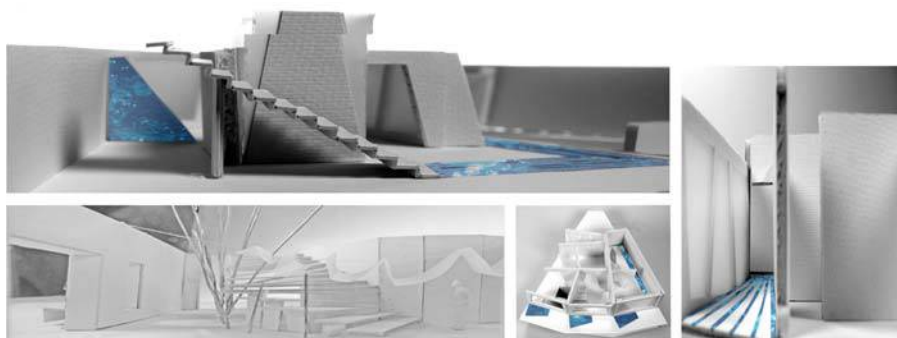


Plate 10.
(bottom left) Student G,
musical staircase and
two-canopied music
routes; Student H
(top left, bottom
centre, right) inset
water channels to
tapering spaces

Sources: Author and Student H



Plate 11.
Student I: LEGO®
pods, diffused
light screen and
rebound pods

Source: Author

spatial transitioning. Thinking was strong for 12 of the 22 students, and of surprisingly high level for around 9 students.

The project evidence that the “Co-specialist ASD-educator model” can be a successful autism design model for beginning design students, as an alternative to 1:1 sessions with ASD children, thus providing a “more permanent transferable way of being creative” (MacDermott *et al.*, 2012, p. 77) and a strong foundation for entering the next year of study.

Case study visits prove to be invaluable insights into ASD issues and how a school functions, but it is also recognised “it would be a mistake to assume that the real world is always somewhere else” (Maturana, 2010, p. 171) and the experimentation and learning undertaken in studio is also of real worth. A multi-pronged approach is of greatest value.

A successful aspect of the learning process is the presentation of designs by students to expert teachers such as at West Oaks and Richmond Hill Schools. The opportunity to receive evaluation and on-the-spot feedback, emulating design practice, is of real value. At Richmond Hill, students repeated presentations, in abbreviated form, to teaching assistants, who swapped in with each other from their classrooms to the presentations. This helps student communication and self-confidence skills, testing ability to reduce and deliver the essence of briefs, without preparation time. The headmaster concluded that the process was a valuable learning experience and wanted as many members of staff to hear the students. He said that the ideas were an opportunity to open-up debate and collaborative exchange over possible ways forward in design for autism in a school setting. “The ability to think globally and act locally” (Salama, 2015, p. 332) is the ambition.

Mounting the final 2D student work on A1 boards, so that they can be easily transported and presented to schools, is a good practical move.

Orthographic drawings take a back seat for the presentation to the teachers, as they are less accessible, but are fully considered at the final assessment.

Students present work for a second time just to the tutor, in a more comprehensive way for assessment. They show an improved level of confidence having previously presented the project to the school. This enables reflective learning (Brockbank and McGill, 1998) and critical reflection (Fisher, 2003).

Students evidence capability to meet the challenge of this brief, having open, malleable minds, welcoming the opportunity to make an impact on their future design practice, and providing a testbed of ideas potentially to “generate new knowledge and enact positive change” (Sara and Jones, 2018, p. 326).

The identification and successful use of the “Co-specialist ASD-educator model”, will be of value to universities, as it illustrates how to embed design for autism into the curriculum.

10. Interpretation

Employing this project as a testbed generates some inspired critical thinking (Moon, 2008) and production of good solutions around the project, the design process and the teaching model. The studio outcomes identified:

10.1 Ten Spatial Transitioning Platforms

(1) Transitioning and Time:

- stretching and elongating spaces, a slow reveal of information, acoustically controlled, to support delayed perception, allowing time to process the spaces;
- avoids initiating any sudden rush of sensory information, by smoothing out spatial bottlenecks;
- provides visual clues as to what comes next and what has been, to help reinforce security and familiarity through materials, light, tone and form; and
- works well in combination with Tapering-dissolve Platform.

Spatial transitioning for autism schools

- (2) Transitioning and Tapering-dissolve:
 - a spectrum along a physical continuum;
 - incorporating imperceptibly narrowing spaces and shallow ramps;
 - results in distinct extremes, to support self-regulation and bridge the gap between small and large spaces with very little echo (Williams, 1996) responding to variation across open and closed sensory channels (Delacato, 1974);
 - self-regulation opportunities with a bench parallel to the taper, providing choice of where to sit along the horizontal plane;
 - where the apex of two tapering planes meet, becomes a hug space, and allows the child to control a folding soft wall lining, to exert pressure on their body at times of greater need; and
 - merges well with Time Platform.
- (3) Transitioning and Circulation:
 - clear, straight circulation routes, to avoid being trapped in a wave, with supporting sensory signposting materials;
 - exploiting negative spaces found under staircases, to pause and recalibrate;
 - encourages self-navigation; and
 - works well in combination with the Time and Tapering-dissolve Platforms.
- (4) Transitioning and Looking-back:
 - placing windows and openings to look back on interior spaces;
 - assists with ritualistic behaviours, anxiety levels, self-understanding of own location in a building; and
 - reduces the amount of time physically returning to a space, so increasing learning time.
- (5) Transitioning and Borrowed Thresholds:
 - employing the concept of shakkei or borrowed landscape into the interior;
 - reduces the threshold between the interior and the exterior; and
 - helps with anxieties surrounding sudden sensory change.
- (6) Transitioning and Sinking:
 - excavating exterior and interior spaces to assist with possible site related acoustic issues; and
 - reduces sensory overload.
- (7) Transitioning and Choice:
 - pre-activity/a series of mini- taster sensory spaces to explore part of an activity in a small way, to help build up to the final activity, e.g. playing a percussion wall, before playing an instrument, or relating to a water channel before immersion in a pool;
 - folding surfaces; a ceiling offering the choice of a high space, opening up the volume for physically expressive activities (hypo-sensitive) or a more intimate environment (hyper-sensitive). Below the folding ceiling there is a second ceiling

which stops and starts, so the children can choose to be under an even lower ceiling; and

- assists de-sensitisation and autonomy.

(8) Transitioning and Repetition:

- play activities integrated within architectural forms, repeating and morphing gradually across internal and external environments (Emmons and Anderson, 2006) thereby practising spatial transitioning from inside to out as part of the everyday; e.g. triangular forms indicate learning time, circular forms mean breakout spaces;
- this seamless approach develops the children's generalisation skills (Bogdashina, 2003), pupils make links with what they have learned outside, transferring these across to the inside, and vice-versa, promoting memories in a continuous learning experience;
- works well alongside a contrasting "constant form", e.g. a small Cherry tree within the play-area landscaping, seen from inside and out, facilitates learning by observation of seasonal transformation, without the need physically to transition to the outside; and
- to help reduce fear and sudden sensory variations.

(9) Transitioning and Sequencing:

- creating a series of divided spaces from familiar forms, i.e. pods, to provide a clear structure to a process-based activity;
- can be used in contrasting activities to help cope with moving between fine and gross motor demands; and
- encourages confidence and independent learning.

(10) Transitioning and Sensory Machine:

- employing the building as a transitioning machine to catch and control wind, rain, light, shadows and music;
- slicing into buildings, in the direction of the sun path, to pull the most amount of natural light into darker spaces;
- acoustically treated cantilevered balconies and suspended walkways cast shadows onto the floor and provide the opportunity to learn in indirect light conditions and quieter spaces;
- pivoting folding wall which can provide protection from the wind or, if shut down, can encourage children to play in the wind, building in choice;
- a sound balcony is an opportunity for high sensory input and is open to the elements: rustling wind, trickling rain, sunlight and shadow, so the weather "plays" with the building as well as the children, helping connect children to location; and
- encourages experiential learning in a regulated environment.

11. Implications for future research

These ten Spatial Transitioning Platforms require deeper research to enable them to become "scalable and replicable methodology and prototype" (Mostafa, 2018, p. 308) for practice.

Spatial transitioning for autism schools

A future project with the students could move to the next stage in the design process (Lawson, 1980): to detail design, make and install specific “transitioning insertions” into the circulation spaces of an autism school. Key elements of the future project would be:

- (1) Review by the students of the ten Spatial Transitioning Platforms with reference to related previous diverse student work, such as the examples described in this paper.
- (2) Onsite behavioural observations collected through film, so as not to affect the true spatial experiences of the users. Children would choose between two contrasting in-situ inserts, and the impact of the inserts assessed.
- (3) Critical thinking through interviews at regular intervals: appropriate communication with identified ASD children and their teachers. Necessary adjustments to the insertions to be evaluated and made by the students to reflect the design development process.
- (4) Collaborative analysis of the outcomes with an ASD Positive Behaviour Support expert, OT/sensory integration practitioner, university educator and ASD teacher.
- (5) Tutor reflection and the writing of a subsequent university ASD design brief, to move “Spatial Transitioning Platforms” forward.

References

- Architects and Building Branch, Department for Education (2015), “Area guidelines for SEND and alternative provision including special schools, alternative provision, specially resourced provision and units”, Building Bulletin 104, HM Government, London, December.
- Bogdashina, O. (2003), *Sensory Perceptual Issues in Autism and Asperger Syndrome: Different Sensory Experiences – Different Perceptual Worlds*, Jessica Kingsley, London.
- Brockbank, A. and McGill, I. (1998), *Facilitating Reflective Learning in Higher Education*, SRHE and Open University Press, Milton Keynes.
- Cash, P.J., Hartley, C.G. and Durazo, C.B. (2017), “Behaviour design: a process for integrating behaviour change and design”, *Design Studies*, Vol. 48 No. C, pp. 96-128.
- de Bono, E. (1967), *The Use of Lateral Thinking*, Jonathan Cape, London.
- Delacato, C.H. (1974), *The Ultimate Stranger: Autistic Child*, Doubleday, New York, NY.
- el-Khoury, A., Marcopoulos, C. and Moukheiber, C. (2012), *The living, Breathing, Thinking, Responsive Buildings of the Future*, Thames & Hudson, London.
- Emmons, P.G. and Anderson., L.M. (2006), *Understanding Sensory Dysfunction: Learning, Development and Sensory Dysfunction in Autism Spectrum Disorders, ADHD, Learning Disabilities and Bipolar Disorder*, Jessica Kingsley Publishers, London.
- Fisher, K. (2003), “Demystifying critical reflection: defining criteria for assessment”, *Higher Education Research & Development*, Vol. 22 No. 3, pp. 313-324.
- Fisher, R. and Williams, M. (2004), *Unlocking Creativity*, David Fulton Publishers, London.
- Heller, S. (2002), *Too Loud, Too Bright, Too Fast, Too Tight*, HarperCollins Publishers, Glasgow.
- Henry, C. (2011), “Designing for autism: spatial considerations”, available at: www.archdaily.com/179359/designing-for-autism-spatial-considerations/ (accessed 2 December 2018).
- Kanner, L. (1943), “Autistic disturbances of affective contact”, *Nervous Child*, Vol. 2, pp. 217-250.
- Kedar, I. (2012), *Ido in Autismland*, Sharon Kedar.
- Khare, R. and Mullick, A. (2009), “Incorporating the behavioral dimension in designing inclusive learning environment for autism”, *International Journal of Architectural Research*, Vol. 3 No. 3, pp. 45-64.

- Kolb, D.A. (2005), *Experiential Learning: Experience as the Source of Learning and Development*, Prentice Hall, Englewood Cliffs, NJ.
- Lawson, B. (1980), *How Designers Think*, Architectural Press, Oxford.
- Lawson, W. (2000), *Life Behind Glass*, Jessica Kingsley, Philadelphia, PA.
- Lawson, W. (2001), *Understanding and Working with the Spectrum of Autism*, Jessica Kingsley Publishers Ltd, London.
- LeGoff, D., Gómez de la Cuesta, G., Krauss, G. and Baron-Cohen, S. (2014), *LEGO®-Based Therapy*, Jessica Kingsley Publishers, London.
- Love, J.S. (2018), "Sensory spaces: sensory learning – an experimental approach to educating our future designers to design autism schools", *International Journal of Architectural Research*, Vol. 12 No. 3, pp. 152-169.
- MacDermott, J., Appleyard, G., Dixon, P. and Love, J. (2012), "Emotion, emotion, emotion the spirit of being human", in Rogers, P. (Ed.), *Interiors Education Futures: Contemporary Insights*, Libri Publishing, London, pp. 75-84.
- Mara, D., McLaughlin, S. and Menzies, L. (2015), "Richmond hill rainbow base position paper", Leeds City Council, Leeds, May, available at: [www.eteach.com/DataFiles/VacDocs/20322/639997/Richmond%20Hill%20Rainbow%20Base%20Position%20Paper%20\(May,%202015\).pdf](http://www.eteach.com/DataFiles/VacDocs/20322/639997/Richmond%20Hill%20Rainbow%20Base%20Position%20Paper%20(May,%202015).pdf) (accessed 2 December 2018).
- Maturana, B.C. (2010), "How spike and the slum dweller find reality in design studio handouts: an exploration of reality in the design studio", *International Journal of Architectural Research*, Vol. 4 Nos 2-3, pp. 158-173.
- Moon, J. (2008), *Critical Thinking*, Routledge, London.
- Moskow, K. and Linn., R. (2010), *Small Scale: Creative Solutions for Better City Living*, Princeton Architectural Press, New York, NY.
- Mostafa, M. (2018), "Designing for autism: an ASPECTSS™ post-occupancy evaluation of learning environments", *International Journal of Architectural Research*, Vol. 12 No. 3, pp. 308-326.
- Salama, A. (2015), *Spatial Design Education: New Directions for Pedagogy in Architecture and Beyond*, Routledge, London.
- Sara, R. and Jones, M. (2018), "The university as agent of change in the city: co-creation of live community architecture", *International Journal of Architectural Research*, Vol. 12 No. 1, pp. 326-337.
- Scott, I. (2009), "Designing learning spaces for children on the autism spectrum", *Good Autism Practice*, Vol. 10 No. 1, pp. 36-51.
- Temple Grandin (2010), Temple Grandin, [dvd], HBO Films, 6 February.
- Williams, D. (1996), *Autism: An Inside-Out Approach*, Jessica Kingsley, London.
-