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Citation:

Love, J (2022) Sensory spaces: sensory living – studio teaching the design of autism-friendly adult accommodation. ArchNet - IJAR. ISSN 1938-7806 DOI: <https://doi.org/10.1108/ARCH-11-2021-0321>

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Document Version:

Article (Accepted Version)

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Sensory spaces: sensory living – studio teaching the design of autism-friendly adult accommodation

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Abstract

Purpose – The study aims to evaluate: (1) How university students from interior architecture can create a forward-looking “Sensory Living” brief informed by both external autism experts and a specialist tutor, evidenced through Leeds City Council’s live autism adult accommodation project. (2) Issues involved with moving an experimental studio teaching model online during the COVID-19 pandemic.

Design/methodology/approach – A grounded theory approach informs an innovative teaching model, run over two years, to create a better normal; challenges and opportunities are critiqued.

Findings – Feedback from experienced autism-specific experts raises recurring sensory and communication issues which frame a series of design problems to help inform the student briefs. Students learn that the designer as advocate for vulnerable users is imperative. Aspects of online teaching that can benefit an experimental studio teaching model are identified.

Practical implications – Identification of the responsive “Sensory Living Model” illustrates (1) How local authorities can avoid seclusion and integrate meaningful “continuous learning opportunities” into autism-friendly adult accommodation for post-pandemic health and wellbeing. (2) How to embed autism-friendly design in the university curriculum.

Social implications – The study helps address some of the UK Government’s “National strategy for autistic children, young people and adults: 2021 to 2026”.

Originality/value – “Ten Novel Sensory Living Themes” are uncovered to help inform the design of autism-friendly adult accommodation. These are of value to (1) local authorities and design practitioners in formulating design briefs and (2) universities in educating future designers of inclusive spaces.

Keywords Autism-friendly architecture, Adult living accommodation, Inclusion, Sensory integration, Blended delivery, Pandemic

Paper type Research paper

1. Introduction

UK Government has promised change to the legal definition of “mental disorder” in the Mental Health Acts 1983 and 2007, in England and Wales, to exclude autism. This addresses inappropriate inpatient unit detention (HM Government, 2012; Povey, 2021) of “2,070 learning disabilities and/or autism inpatients at the end of Oct 2021” (NHS, 2021). With 5.5 years average stay, “we continue to hear alarming cases of overmedication, seclusion and unnecessary restraint” (NAS, 2021a).

Sensory overload from noise, bright lights and busy, unpredictable inpatient units, can cause great suffering for those with sensory sensitivities. If environment is not adjusted and the autistic adult not supported by professionals who understand autism, distress symptoms can increase, resulting in further restrictions being imposed, reducing chances of discharge. Compounding this, there are insufficient appropriately designed services available to assist moving into the community (NAS, 2021a).

Growing needs, of some autistic adults, require swift local authority action over long-awaited specialist accommodation, not only for moves from inpatient units but also shortfall of appropriate provision in the wider community (NAS, 2021a). The new Autism Strategy proposes to “improve housing to include what is good for autistic people” (HM Government, 2021, p. 22). This could take years to reach fruition.

Further, “the Office for National Statistics (ONS) has published new data that shows just 22% of autistic adults are in any kind of employment” – shocking data, worse than previously recorded in charity surveys (NAS, 2021b).

This study explores how, through forward-thinking live design projects, undergraduate Interior Architecture students can weave meaningful lifelong learning activities into design of autistic adult accommodation. Providing purposeful living environments (Salama, 2009) helps some autistic adults who require 24 h, 1:1 support, with improved self-esteem, less likelihood of having “mental health problems” (HM Government, 2021, p. 15), growing independence and broadening skills base. The potential of autistic people is often untapped and underappreciated (Solomon, 2020); this proposition explores the fusion of learning skills and everyday living environment.

No attempt has been made to describe the full design development process, nor propose comprehensive design solutions; instead, focus is on development of student briefs.

In addition to seeking how interior architecture students can create a “Sensory Living” brief informed by both external autism experts and specialist tutor, this paper addresses moving an experimental studio teaching model online during the COVID-19 pandemic. Figure 1 illustrates project stages and timeline.

2. Methodology of the “Sensory Living Model”

Grounded theory methodology is employed in this study, evidenced through live accommodation projects based on the behaviour informed design “Co-specialist ASD-educator model” (Love, 2019), a model tested over 6 years’ teaching design of schools for autistic children and Young Autistic Adults (YA’s). A new “Sensory Living Model” emerges, placing greater emphasis on person-centred brief writing to help inform the client, in this case Leeds City Council (LCC) in respect of its “live” adult autism accommodation project to house a “micro family community” for 6 adults, 6 carers and supporting staff.

Students are challenged to think differently to generate ideas, take informed risks and imagine environments from the diverse perspectives of autistic people, of which no two are the same and their individual sensory sensitivities. In contrast to the restraints that intense time pressure can impose in a professional studio setting, the experimental approach described may inspire design practitioners to test ideas and ground them in reality; this is where research-informed design can make a difference, as illustrated in this paper.

The project foundation is a deep level of critical thinking and student development of a research-informed brief, which examines current autism issues. Involved is exploration of how students formulate proposed briefs, through distance delivery and collaboration with three specialist expert autism practitioners and their tutor as educator, whose research expertise is in teaching autism-friendly design.

Qualitative research is enabled through inputs of the following three highly experienced autism experts, each having everyday hands-on contact (Sheykhmaleki *et al.*, 2021) with autistic adults:

- (1) Care-lead (CL), residential accommodation for YA’s on campus, Henshaw’s Specialist College, North Yorkshire (Henshaw’s).
- (2) Specialist Occupational Therapist and Advanced Sensory Integration Practitioner (OT), OT4me, North Yorkshire.
- (3) Senior Behaviour Analyst (SBA), college and residential accommodation on campus, Henshaw’s.

2.1 The “Sensory Living Model”

Figure 1 illustrates the project timeline and the following 5 developmental stages:

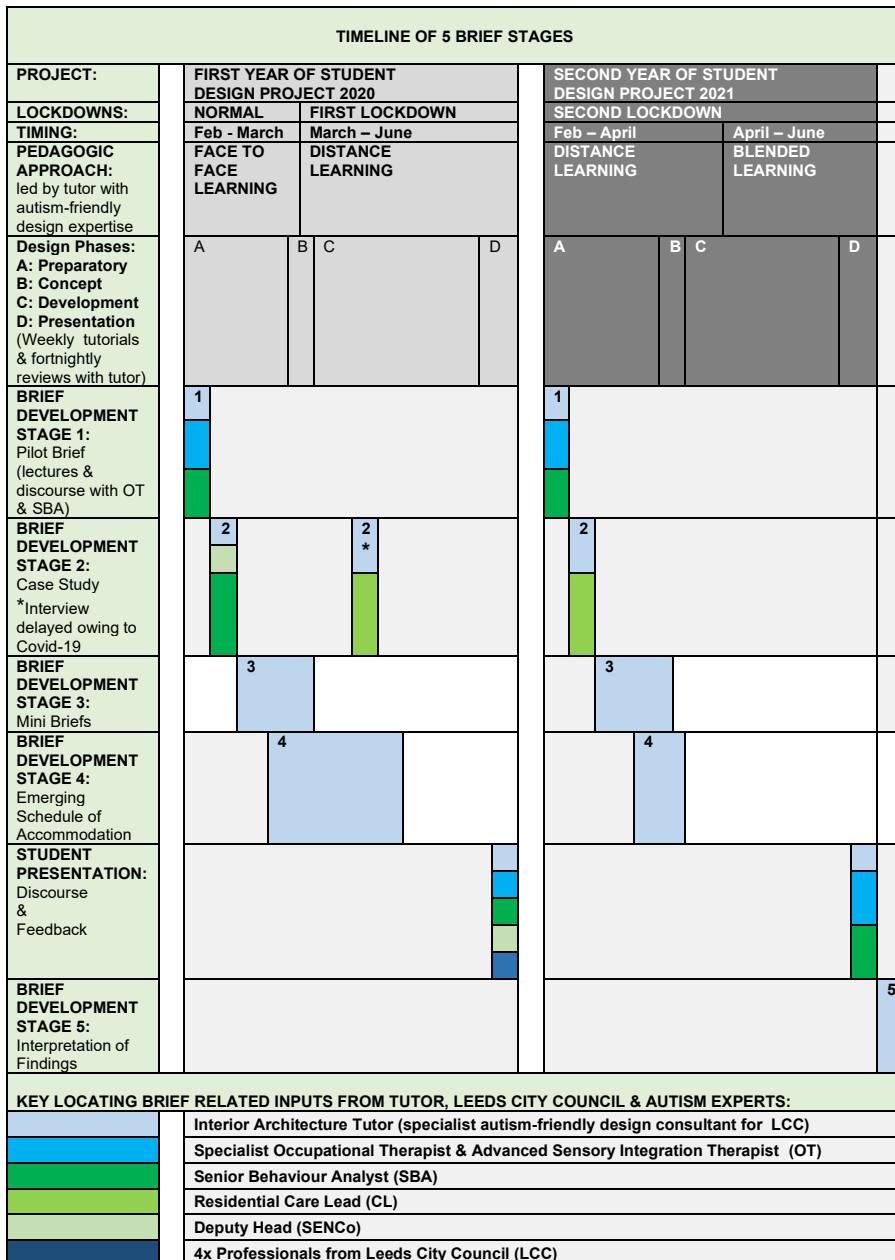


Figure 1.
Timeline of the 5 brief stages

- (1) Pilot brief; experts as co-creators; the autistic voice; principles. Pilot brief is issued to students and tutor provides early guidance on autism and environment. OT and SBA deliver synchronous lectures covering understanding of autism relating to sensory integration and positive behavioural support, followed by discourse with students (see Figure 2).

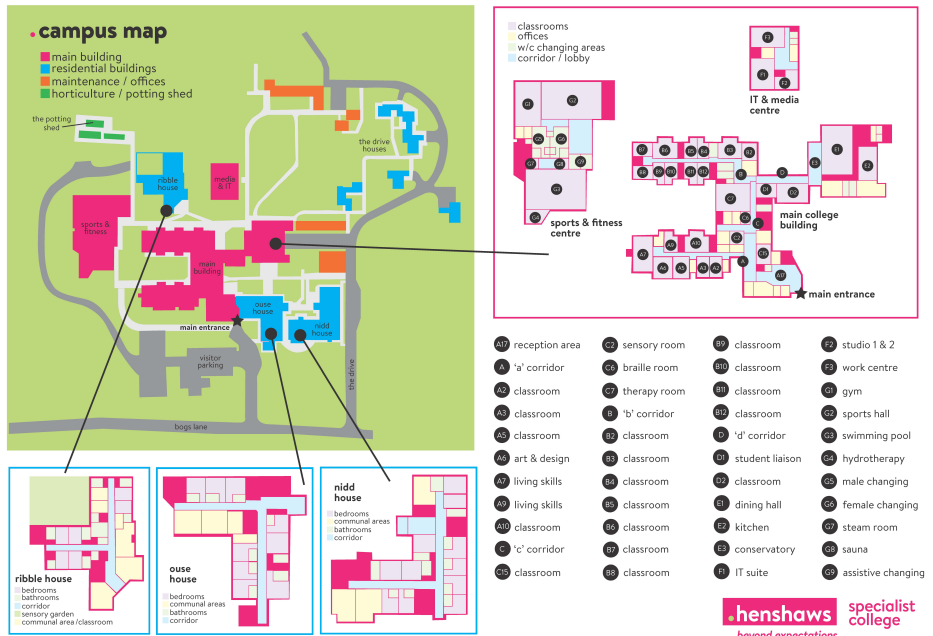


Figure 2.
Henshaw's site
plan

- (2) Case study. Tour of Henshaw's, in year one of brief, with SBA, followed by asynchronous interview with CL shared with students online.
- (3) Eight exemplar student mini-briefs (Figures 3 and 4). Students' individual early briefs are defined and continue to grow and deepen throughout the design process. To contextualise, an exemplar student project illustrates the development of mini-brief 3, through two design presentation sheets (Figures 5 and 6). 8 mini-briefs to "mix and match" are compiled to help inform practitioners for future research.
- (4) Emerging schedule of accommodation. Evolved alongside the pilot brief, a series of key purposeful spaces are issued to students and provide, where viable, choice. Students combine this with knowledge from specialist case study interview and define individual schedules.
- (5) Interpretation of findings – ten novel sensory living themes. Extracted from all 4 stages above, plus feedback from student presentations to professionals, a series of ideas and possibilities emerge for future examination to help inform responsive environments for autistic adults.

2.2 Timing

Run twice, over two years, during COVID-19, the "Sensory Living Model", pedagogical approach and delivery moved through different stages of lockdown as set out in Figure 1.

The study critiques the challenges and opportunities of blended and distance learning, assessment and student experience, in the early phase of a live project which was put on hold by LCC owing to COVID-19.

Although the study focusses on brief development, the students develop design ideas into a complete proposal. Synchronous feedback is delivered by a team of four professionals at

MINI BRIEFS 1-4		
MINI BRIEF 1	INTRO	Incorporate a calming dog companion and interior and exterior agility circuits for dog and adult. Dogs are happy to undertake the same exercise repeatedly, so are well suited for some autistic people with repetitive behaviours
	ISSUE	Difficulty with social interaction and communication/anxiety
	LIFE SKILLS	Developing, understanding, and maintaining relationships; understanding thresholds and boundaries e.g., where the dog is allowed and not allowed; giving responsibility and help to understand emotion and empathy
	SENSORY INTEGRATION	Provides proprioceptive feedback
	EMPLOYABILITY OPPORTUNITIES	Dog walking and veterinary practice
MINI BRIEF 2	INTRO	Incorporate arts and craft spaces which harvest and reuse rainwater to make online sensory art cards from paper pulp, to be sold in the community as a social enterprise
	ISSUE	Tactile sensitivity
	LIFE SKILLS	Cleaning/vacuuming, tidying
	SENSORY INTEGRATION	Tactile system receives feedback from sand, water, paint, rolling paper pulp, for a full body experience; utensils for those who do not like touching materials, stencils, pencils; a water pully for proprioceptive input
	EMPLOYABILITY OPPORTUNITIES	Computer and business
MINI BRIEF 3	INTRO	Incorporate a fruit orchard and jam making in the kitchen to be sold at a local farmers' market as a social enterprise
	ISSUE	Lack of self-esteem
	LIFE SKILLS	Cooking, organisation
	SENSORY INTEGRATION	Fruit picking provides opportunities to cross the centre line to improve co-ordination
	CONTRASTING PHYSICAL ACTIVITY	Swinging (vestibular input) for calming through up and down and side to side motions
EMPLOYABILITY OPPORTUNITIES	Horticulture and catering	
MINI BRIEF 4	INTRO	Incorporate bonsai tree growing spaces. As an outdoor and indoor plant, they bridge the major transitional gap between the two environments
	ISSUE	Lack of understanding of abstract concepts e.g., life cycles/time
	LIFE SKILLS	Responsibility, communication
	SENSORY INTEGRATION/ FINE MOTOR SKILLS	Tactile system receives feedback from soil, water, leaves, pruning and shaping. Pouring water from a bucket into a filter, tests proprioceptive skills of weight bearing
	CONTRASTING PHYSICAL ACTIVITY	Music and dance workshop (vestibular input)
	EMPLOYABILITY OPPORTUNITIES	Horticulture

Figure 3.
Mini-briefs 1–4 to “mix and match” with pilot brief

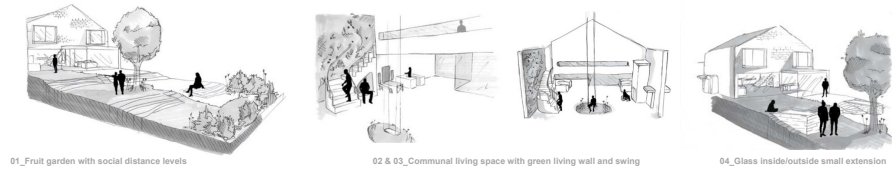
LCC, a deputy head and Special Educational Needs Co-ordinator (SENCo) and OT and SBA experts. Each year of the project feeds and informs subsequent years in a continuous cycle of evolving learning.

MINI BRIEFS 5-8		
MINI BRIEF 5	INTRO	Incorporate mask making workshop and small performance space. Opportunities to perform to family and friends
	ISSUE	Difficulties with social interaction and communication
	LIFE SKILLS	Confidence building, autonomy
	SENSORY INTEGRATION	Tactile system receives feedback from papier-mâché, cutting, gluing
	CONTRASTING PHYSICAL ACTIVITY	Inside table tennis, for wet/cold weather (vestibular input)
	EMPLOYABILITY OPPORTUNITIES	Entertainment industry
MINI BRIEF 6	INTRO	Incorporate a small petting zoo e.g., rabbits, hedgehogs, chinchillas, tortoises, guinea pigs
	ISSUE	Difficulties with social interaction and communication
	LIFE SKILLS	Developing, understanding, and maintaining relationships
	SENSORY INTEGRATION	Provides tactile feedback
	CONTRASTING PHYSICAL ACTIVITY	External rebound trampoline and green gym equipment (proprioceptive input) to provide resistance against the joints
	EMPLOYABILITY OPPORTUNITIES	Veterinary practice
MINI BRIEF 7	INTRO	Keep chickens to learn how to nurture another and understand the benefits of food; feeding chickens and learning how to cook eggs in various ways (closed loop); indoor and outdoor cooking and dining areas to offer a more calming environment
	ISSUE	Eating disorder
	LIFE SKILLS	Cooking, cleaning, socialisation
	SENSORY INTEGRATION/ GROSS MOTOR SKILLS	Pushing a wheelbarrow and digging into land assists with proprioceptive difficulties, placing resistance against muscles; helps with taste and olfactory dysfunction
	EMPLOYABILITY OPPORTUNITIES	Catering and horticulture
MINI BRIEF 8	INTRO	Creation of alternative sleeping spaces, from under the bed, to top bunk, to corner, to floor level. Provision of acoustic pods, large and small, for each key function e.g., sleeping pod, bathing pod, dressing pod. Acoustic pods help with those sensitive to sound by reducing the transfer of noise between spaces and to help sequence spaces (Author, 2019) and to define activity more clearly
	ISSUE	Sleeping disorder/acoustic sensitivity (Forde et al., 2021)
	LIFE SKILLS	Develop sleep routine, bed making, laundry, self-hygiene
	SENSORY INTEGRATION	External cycle track provides physical activity to burn off energy and provide vestibular feedback; an immersive pool and sensory garden, to calm and provide tactile input
EMPLOYABILITY OPPORTUNITIES	Hospitality industry	

Figure 4. Mini-briefs 5–8 to “mix and match” with pilot brief

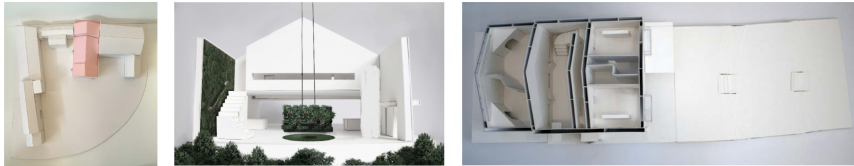
3. Brief development stage 1: pilot brief

A fundamental aspect of formulating an autism-friendly adult accommodation design brief is student access. The importance of undertaking evidenced-based research is established



BRIEF: THIS LIVE PROJECT PROPOSAL IS IN RESPONSE TO THE EXTREME LACK OF APPROPRIATE PROVISION OF PERSON-CENTERED LIVING ACCOMMODATION FOR AUTISTIC ADULTS, WITH ASSOCIATED LEARNING DIFFICULTIES, WHO REQUIRE 24-HOUR SUPPORT, WITHIN THE CITY OF LEEDS.

The project aims to help Leeds City Council formulate a working brief and to present a series of design ideas to help inform and pave the way for their current autism adult living accommodation project, avoiding 'too much sensory information' in the autistic adults' environments. Opportunities for life-long learning will be woven throughout the design, through structured, hands-on tasks and activities, in the form of growing and harvesting soft fruits, making jam, jarring and labelling the jam for sale. Improving behaviours and enabling people to grow and develop in confidence and independence is central to the project. Additionally, the brief provides an opportunity to respond to the Covid-19 pandemic, integrating a series of design ideas relating to social distancing, hygiene and materials with natural anti-microbial properties.



LIVE PROJECT _AUTISM-FRIENDLY ADULT LIVING ACCOMMODATION_ FIRST YEAR_BA (HONS) INTERIOR ARCHITECTURE & DESIGN

Figure 5.
Exemplar student presentation sheet illustrating swing and fruit garden



DESIGN PRINCIPLES: QUIET DESIGN, NEUTRAL COLOUR PALETTE, COMMUNITY, INCLUSION, REDUCING SPATIAL TRANSITIONING/BLURRING THE BOUNDARIES, AUTONOMY OF CHOICE, AT ONE WITH THE LANDSCAPE, POSITIVE BEHAVIOURAL STRATEGIES.

Autism ASPECTSS™ design principles have been integrated: Acoustics, Spatial Sequencing, Escape Spaces, Compartmentalisation, Transition Spaces, Sensory Zoning, Safety. Opportunities for Sensory Integration for Hyper-sensitivities and Hypo-sensitivities: Vestibular, Tactile, Proprioceptive, have been provided.

LIVE PROJECT _AUTISM-FRIENDLY ADULT LIVING ACCOMMODATION_ FIRST YEAR_BA (HONS) INTERIOR ARCHITECTURE & DESIGN

Figure 6.
Exemplar student presentation sheet illustrating sketches and models

through immediate access to autism experts and the autistic voice, to help inform and establish a person-centred brief with real issues.

3.1 Pilot brief shared with LCC and students

A pilot brief, formulated by the interior architecture and design tutor, is based on consultation work on the live LCC project. The tutor scales-down this pilot brief to fast-track first-year students into a complex and challenging project. To encourage good practice, contents are discussed with students who are encouraged to take individual approaches in response to autistic adults' sensory needs, accounting for both hyper- and hypo-sensitivities and special motivating interests.

This project is about creating person-centred living accommodation for 6 young autistic adults with associated learning disabilities who require 24-h 1:1 support. The driving force behind the project is to create an environment where residents are provided with opportunities for life-long learning through structured, hands-on tasks and activities. These tasks and activities will be within their accommodation as well as in the wider external community. Structured tasks will be woven throughout the pattern of their day, and will help them to develop life, communication, and social skills, keeping them occupied, engaged, and fulfilled. This approach will help to reduce frustration and anxiety, to achieve goals (no matter how small), maintain physical and mental health and improve quality of life.

The project acknowledges that many autistic people receive enjoyment in the companionship and stimulation of being with others of a similar age, sensory needs, and interests, and this is the first step towards inclusion (Brand, 2010).

The project is not about a “one-size fits all” approach, or social isolation, or restrictions or limitations. It is about implementing positive behavioural strategies, widening expectations through providing diverse opportunities and creating an environment which attempts to be as responsive as possible. Improving behaviours and enabling people to grow and develop is central to the project.

3.2 Students access autism experts as co-creators

Five main autism related environmental issues are established from observations made by the SBA and OT:

- (1) SBA: There is too much seclusion in “safe rooms” usually located in inpatient units and can be used improperly (Care Quality Commission, 2020). Advice: Avoid providing timeout spaces, the collective term for a place of retreat (Schrameijer, 2021), where doors can be shut and people excluded. Instead, Mostafa suggests open “escape spaces” (Mostafa, 2014). “Provide environments which keep people occupied, undertaking something which is meaningful, then behaviours will improve (Vermeulen, 2014), and people’s rights will be protected”.
- (2) SBA: “Transitioning between spaces for autistic people is a behavioural phenomenon, people do not really know why transitions are such a huge problem for such a lot of autistic people”. Change in environment can be difficult, and strategies need to be employed (NAS, 2021c; Love, 2019, 2020a).
- (3) SBA: “People spend far too much time trying to eliminate certain behaviours with autistic people and they are focusing on the wrong thing”. Advice: “for good outcomes, focus on people’s happiness (Vermeulen, 2014), engagement, and quality of life”.
- (4) OT: “99.9% of those that I assess or treat with sensory difficulties have difficulties with noise, which causes distress”.
- (5) OT: Sensory sensitivities are found in over 90% of autistic adults (Crane *et al.*, 2009; Balasco *et al.*, 2020). Advice: Provide a sensory diet through “activities which challenge people and give them a purpose in life”. “Providing stimulation for residents with under-developed sensory sensitivities can reduce complex behaviour” (Brand, 2010, p. 18).

3.3 Students access the autistic voice in lockdown

Important empirical research “to address how health is an integral component in the production of architecture” (Maturana *et al.*, 2021) proved challenging in lockdown; students’ inability to visit live case study buildings hindered visualisation of spaces, needs and

functions. Even filming residential spaces at Henshaw's by the SBA was not practical as the YA's bubbles could not be crossed in the timeframe. Instead, past annotated photographs were shared and discussed online.

Adopting alternative approaches has benefits, for example by taking advantage of social media through which some of the autism community communicate widely. Students are directed towards social media platforms such as Pete Wharmby's Twitter threads @commaficionado and neurodivergent_lou on Instagram. Access to these continually updated autistic experiences provides insightful, fast-track research into sensory impact of environment on lives. Recommended reading included the voice of autistic adults in "Our Autistic Lives" (Ratcliffe, 2020), "Explaining Humans" (Pang, 2020) and Love's paper on a Sensorium workshop with an autistic adult (Love, 2020b). A diverse range of viewpoints, collected in a body of resources, is vital as each autistic person is so different from the next.

Access for me became easier unexpectedly the last year. Suddenly, there were fewer crowds in public spaces, people stayed 6 feet away from me, I did not have the expectation to read people's faces. I hope that society has seen how to become a more sensory-friendly place (Ackerman, 2021).

The variety of distance learning opportunities during lockdown proved highly valuable. The tutor accessed The NAS Autism Show's webinar: "Autistic Perspectives" (Povey, 2021), presentations by autistic adults at the forefront of autism knowledge. This enabled discourse with students surrounding highly pertinent research, primarily concerning wellbeing, sleeping and eating issues.

3.4 Establishing three introductory principles

- (1) Discourse with client: LCC's original draft brief proposed six separate self-contained flats rather than a communal living environment; specialist consultant tutor advised that this might, for some people (whether residents or staff), create isolation and mental health issues plus safety concerns for vulnerable adults.
- (2) The brief follows the NAS SPELL framework, aiming to reduce barriers that social communication, social interaction, social imagination and sensory difficulties can introduce to autistic adults (NAS, 2021d).
- (3) ASPECTSS™ design principles are employed (Mostafa, 2014).

4. Brief development stage 2: case study

Henshaw's is adopted as a case study, helping define issues of social distancing. This strong point of reference is both an educational and residential campus, providing activities for learning on site. A variety of buildings and external grounds, illustrated on the site plan at Figure 2, allow for flexibility of use keeping YA's occupied, gym, swimming pool, forest school, social enterprise spaces. This combination of spaces can inform a "micro family community".

4.1 Findings from interviewing an autistic adult care expert (May 2020)

The CL detailed COVID-19 issues and responses, including Henshaw's changes to residential spaces, when Public Health England introduced 2-m social distancing. Henshaw's provision reduced to accommodate a lower proportion of YA's (with 54% of YA's on limited offer) but returned once the "1-m-plus" rule was applied (July 2020). Evaluating a worst-case scenario to date strengthens future responsive design, especially in the context of vulnerable adults with complex health needs and an uncertain future.

Residential accommodation

- (1) Bedrooms: YA's have individual bedrooms; no issues with social distancing.
- (2) Bath/Shower rooms: cleaned every day pre-pandemic; now door handles and light switches cleaned continually.
- (3) Kitchen: social distancing issues, as only 1 kitchen.
- (4) Dining room: 1 large table in 4 separable sections. If a YA is struggling to socially distance, their table section is moved away for extra room.
- (5) Lounge 1: separate sofa and chairs relocated to furthest points apart; sofa on back wall, 2 chairs on side walls, fortunately, a large room with plenty of flexible space.
- (6) Quiet lounge 2: used much more than previously, providing extra space to help social distancing.
- (7) Corridor: most challenging space, as under 2 metres wide. YA's and staff together, use it frequently. If a YA wants to sit in the corridor, and many like to, then social distancing is impossible.
- (8) Office for 2 staff: furniture moved to separate staff as much as possible, but space restrictions limit this to 1.5 metres. A third team member sits in another office. Private conversations cannot be socially distanced; if the office was 2 metres wider, this could be achieved.
- (9) Lifts: (smaller than 2 m) staff lifts to transfer laundry etc. Wheelchair users have ground floor rooms. If lifts are used with a YA, they are only in the lift for a short time and staff members wear PPE.
- (10) Windows: the restrictors (10 cm max opening) are not conducive to preferred levels of natural ventilation. Windows can be opened further (key) but then require risk assessment, specific to individual YA's.
- (11) Outside space: used much more than pre-pandemic, particularly courtyard style spaces between buildings with swings. The situation encourages use of outside space more creatively.
- (12) Circulation: no comprehensive one-way policy, as buildings have dead-ends and not based on full-loop circulation. "Keep to the left" policy is adopted.
- (13) Passing Places: utilised because corridors are not sufficiently wide, as would be preferable. This depends on a "right place at the right time" scenario and an awareness of the best slots to direct a YA, if possible.
- (14) Stairs: wide staircase with very wide half-landing works well; users can see who is coming and can pause on landing to let YA and staff pass.
- (15) Separate staff flat: located on the same floor as main YA accommodation, this would become highly useful if someone needs to isolate from the rest of campus. However, the current staff member (night staff) would then be displaced, so it would be helpful to have 2 self-contained spaces: 1 staff flat and a smaller bedroom suite. This suite could be used not only in a pandemic situation, but also to isolate someone with Norovirus, for respite provision, for emergency placement, or if another room was under repair.
- (16) Hand washing: currently, the only provision is YA's individual shower/bathrooms. Additional handwashing stations at entrances, which act as visual prompts, are

desirable. For some YA's, hand washing is no issue; for others, who are not used to washing hands and do not find it natural, it is demanding. No amount of practice makes any difference for these YA's. Since the interview, hand washing stations were introduced at main entrances to buildings.

- (17) PPE: With the current reduced cohort of 25 YA's (18 at any one time) there are no behavioural issues with YA's prompted by staff wearing PPE. Based on some of the YA's history, staff had anticipated greater reaction. Tutor asked if this was owing to less visual information to process (partly covered faces), and the CL did not know. CL thought that communication could suffer, as the YA could not see the staff's facial expressions, and some YA rely on this, but this has not proven to be the case.

4.2 Reflection and discourse on the impact of COVID-19

- (1) 2-m social distancing has helped some YA's understand boundaries. It can be confusing for onlooking YA's who do not like to be touched, when someone who is very tactile receives tactile inputs from a member of staff. With COVID-19, the staff members have had to reduce tactile input.
- (2) Spaces are quieter owing to fewer YA's; staff and YA's have responded well to this.
- (3) At the start of the outbreak, staff had to prioritise which changes to make to spaces. Spaces used frequently were altered first before those used less. With a fast-moving virus, this could be a weak link in the chain of change.
- (4) Communal kitchen and living spaces were most problematic, as they could not meet the greater spacing requirement. Reconfiguring the main lounge and having the choice of a quieter separate lounge, helped resolve this need. However, most of the time, the kitchen remains inaccessible for a large proportion of YA's, and "bubbles" are in place.
- (5) Unless driven by YA needs, Henshaw's does not anticipate reverting any spaces to configurations prior to social distancing. Moving the furniture further apart has created more space and responds to all scenarios.

Students learn that although there are differences between 6-person accommodation (LCC pilot brief) and the large residential provision at Henshaw's, many findings are transferable between the two settings, and experiences of Henshaw's shine light, enabling a more comprehensive viewpoint, on future smaller scale provision. Over decades, many diverse YA's wide-ranging needs have been met, within the given building constraints, by the expert autism team at Henshaw's.

4.3 Design precedent

Students explored well-designed supported living environments from Linden Farm, England and Sweetwater Spectrum, California, to more diverse exemplars such as Andy's Goldsworthy's spiral stone paths to inspire the design of sensory gardens. Students learn that there is a pressing need for more considered human-centred design for autism.

5. Brief development stage 3: mini-briefs

Brief development involves eight exemplar issue-based student mini-briefs which weave purposeful activities and sensory integration into adult accommodation. Informed by inputs of autism experts, the pilot brief and their own autism research, each student applies critical

thinking to develop a specialist brief; recognised autism issues inspire and instruct briefs to help develop a series of life and employment skills. Each brief is aimed at treating problems as opportunities, inspiring live practice projects and adding to accumulative knowledge on adult autism-friendly accommodation (Brand, 2010; Gaudion, 2013; Mostafa, 2014; Steele and Ahrentzen, 2015; Nguyen et al., 2020a).

Woven into each brief are sensory integration opportunities undertaken through activities, improving how the brain can process sensory information fed via our eight senses. Sensory integration can help people who have sensory dysfunction or sensitivities, to modulate their senses to an optimum level of alertness, so that they can interact more effectively with their environment and reduce the chances of sensory overload (Williams and Shellenberger, 1994). All briefs also include process-based activities which help improve praxis difficulties.

5.1 Issue-based mini-briefs

The intention is for local authorities to mix and match mini-briefs, which are reduced from the students' longer briefs, to help create a "micro family community". Recommended is provision of diverse activities to broaden an occupant's skills base but also providing choice (Love, 2020b) in activity depending on the sensory needs of any individual and their likes and dislikes (Brand and Gaudion, 2012). "Studies found that physical activity has many benefits for autistic people, such as increasing well-being, helping with emotional regulation, improving walking gait and balance, and raising activity levels" (Hallett, 2019).

All briefs are aimed at "an expanded understanding of people with disabilities' lived experience of the built environment" (Martel *et al.*, 2021) and providing autistic adults not only with a foundation for the future, whether through voluntary work, self-employment or employment, but also with important competences such as "building confidence, developing independence and supporting achievement" (Henshaw's, 2021).

6. Brief development stage 4: emerging schedule of accommodation

Students use the Interior and Exterior schedules below as a starting point for their own personalised project briefs.

They learn:

- (1) The skill of negotiating their proposed spaces, at tutorials, according to priority of need and function.
- (2) The importance of researching into autistic adults' needs to drive spatial requirements.

6.1 Interior

Provide the following nine main spaces, as well as weaving in activity and special interest spaces, as recommended in the students' mini-briefs (Figures 3 and 4), depending on individual need and space allowances.

- (1) Entrance – should contain an external canopy (Love, 2019) and pause place and internal adjacent pause place/seated waiting zone. These zones should be generously sized to allow for space to transition from inside to outside and a quieter side entrance for residents.
- (2) Communal living room.
- (3) Quiet living room.

- (4) Teaching kitchen with dining zone. A central hub of group activity and learning: menus and shopping items could be planned together around a dedicated zone (white board/PEC'S board); shopping trips to the local high street or supermarket to be planned and undertaken as a team or “family”; setting the table, preparing, cooking, serving food, washing and drying up, putting dishes away.
- (5) Quiet pantry kitchen for making drinks and simple meals, with easy access to snacks/ a fridge.
- (6) Separate utility room, to keep noisy equipment apart (Mostafa, 2014).
- (7) Well-sized separate dining room.
- (8) Double Bedrooms with ensuite. Baths are required to all bedrooms as many autistic people have tactile sensitivity to showers. A separate shower is useful for incontinence issues/quick clean ups and some residents find them calming so they should also be available.
Sight lines from entrance door across the room must be clear so that any carer has time to read the situation and see the resident. Design options to address sound transfer: consider acoustic sleeping pods or separate bedrooms at either end of the building, so that one person is not going to disrupt the other, if they are making more noise, or if they are having a difficult period, or if somebody likes quiet and separation of a bedroom suite, if required as a “shielding” environment. Allow for the opportunity to personalise a bedroom.
- (9) Staff facilities to suit each brief.

6.2 Exterior

Autistic adults require access to quality outside space for health and wellbeing; this is particularly so in times of COVID-19 when many vulnerable people have been shielding at home. A well-designed garden can enhance focus and attention and reduce anxiety, thereby improving quality of life (Gaudion and McGinley, 2012). Depending on available space, any combination of the following three zones offers choice of activity, for exercise, special interest, occupation and leisure:

- (1) “Time Out” zone for exercising or special interests. Transitioning between inside and outside spaces should be softened, to reduce sudden sensory change (Love, 2020a). This could take the form of an external canopy or veranda and can be utilised in inclement weather.
A “mile a day” external path was quickly instigated in late March 2020 in lockdown by the Principal at Henshaw’s, giving a safe route around the campus. This idea could be translated in a small way into a garden and possibly extended into the immediate surrounding area if space is at a premium, to provide a safe exercise option and an opportunity to distract a resident or provide a change of scene.
- (2) “Horticulture” occupational zones, e.g. raised beds to grow herbs and small plants (Brand, 2010), accessible for anybody who has any kind of disability or mobility need. Some autistic people do struggle with their posture and balance, so to be able to perch on the end of a raised bed and not be bending down onto the floor is ideal and/or a walk-in polytunnel to pot and grow plants and vegetables.
- (3) “Sensory Garden” zones for leisure. A series of low maintenance calming spaces which grow nontoxic plants with different textures and scents e.g. long soft grasses

which sway in the wind. Some spaces may be orderly and others wild. A choice of small seating areas should be provided, including a quiet area so that some residents do not feel forced to be outside with others.

7. Brief development stage 5: interpretation of findings

7.1 Ten Novel sensory living themes

The students' design projects act as vehicles to test a series of design ideas which receive feedback from autism professionals. Innovative responses gave rise to a set of design propositions or themes, to encourage a progressive approach to the design of future autistic adult accommodation. These findings are not intended to be a set of fixed design guidelines, but to encourage other scholars and practitioners to research into these areas further to add to the slowly growing body of knowledge.

7.2 Sensory and a sense of home

- (1) Adaptability. A calm, comfortable, homely environment; a neutral canvas but provide the opportunity to personalise some spaces e.g. bedrooms; non-institutional.

7.3 Sensory and meaningful activities (sensory diet)

- (1) Housework related activities. The residents will learn about structure, routine, predictability, responsibility and reassurance by undertaking meaningful activities, such as cleaning their bedrooms (dusting and vacuuming), making their beds, using the washing machine, hanging out washing, using the drier, putting dried clothes away (folding/hanging).
- (2) Diverse activities. Clearly defined layers of diverse activities, so that if something cannot happen, for various reasons, there is an alternative readily available to help pre-empt any behaviour issues. To challenge and support continuous learning. For inspiration, mix and match from the eight exemplar student briefs (Figures 3 and 4).

7.4 Sensory and spaciousness/social distancing

- (1) Proportion. Any buildings need to be generously proportioned and spacious with reasonably high ceilings but of domestic scale to emulate the feel of home. Circulation: ideally generous in width, so residents can see who is coming; this gives time to step out of the way.
- (2) Proximity. Some residents may be sensitive to the amount of personal space which they occupy when several people are close-by; space around furniture should be permitted to allow for issues with proximity, an "arm's-length rule" (NAS, 2021e) to judge personal space.
- (3) Safety. A wide corridor helps manage difficult situations; if someone is trying to bang their head against the wall, it is easier to keep them away from the wall, if there is plenty of surrounding space.
- (4) Space to Pace. Not only is sufficient space required for social distancing with COVID-19 and any future pandemics, but also for those who get very stressed or with poor proprioception who need plenty of space to pace (Ratcliffe, 2020). Ideally in several

key spaces where they spend the greatest time and preferably with a soft wall at one end which residents can push against for sensory resistance.

- (5) External walkways. A possible future consideration, to overcome corridors under 2 m width, is use of covered stairs and walkways on the outside of the building, like an ocean liner, which might reduce the risk of virus spread and introduce thermal shading for a more constant internal temperature. “Spatial and social distancing measures and protocols are altering our understanding of spatial design” (Maturana *et al.*, 2021).

7.5 Sensory and autonomy of choice

- (1) Individualism. Providing a choice of spaces and activities is important as it allows residents to express individual preferences (Kinnaer *et al.*, 2016). Choices of spaces and activities should be noticeably different from each other, e.g. large spaces or small spaces, physical (gross motor) activities or more gentle activities (fine motor). If someone requires a quieter/safer option, away from the more sensory stimulating communal spaces, several possibilities are available: bedroom, quieter living room, pause places, garden. Occasionally, autistic people may take ownership of a specific space and may not like anyone else to occupy that space, so providing choice is a beneficial design move, particularly if it is a communal space e.g. a kitchen.
- (2) Two options. Providing two choices for key communal spaces not only supports social distancing and reduces room capacity but also responds to hyper- and hypo-sensitivities by providing a quieter option.
- (3) Cost saving. Providing a choice of spaces can reduce the time consuming and costly need of retrofitting or revisiting some spaces in response to the changing occupants with differing sensory needs and interests, as options are already incorporated.

7.6 Sensory and inclusion

- (1) Pause places (designated open pockets of “timeout” space) located at regular intervals throughout the environment, particularly between zones of high and low stimulation, e.g. circulation routes, both inside and out, help ease transitioning between environments (Love, 2020a).
- (2) Seclusion can be avoided by locating pause places adjacent to a main activity; this encourages partial engagement, demands less interaction and reduces sensory information.
- (3) Pause places allow the opportunity to structure what is going on around a person who sometimes has difficulties with understanding what might be happening next, what happens in the future and the past. Pause places allow for a timeout moment and the opportunity for visual clues relating to the next activity.
- (4) Pocket doors. Like the ham in a Sandwich, a pocket door slides between two walls, locks in the open position, allowing a clear, open entrance.

7.7 Sensory and components

- (1) Exercise components: OT stated that teachers/carers are always looking for “the novel”, and this is essential in praxis development. An activity which has various configurations makes it new every time. The opportunity to move around and lift heavy components such as mini-ramps, mini-steps, mini-rockers, to form agility

circuits, both internally and externally, provides resistance against muscles for those with proprioceptive dysfunction, providing their sensory needs. Watching a dog go over the circuit first might be encouraging and give the adults confidence to follow.

- (2) Furniture. Modular cross-shaped (in plan) dining tables which provide alternative social adjacencies, e.g. sitting at 90 degrees to another to limit social interaction (also works well to reduce virus transmission), yet providing development opportunities to sit closer or face to face as tolerance grows.

7.8 Sensory and light

- (1) North light. Light from the north is very valuable, as it is softer and more constant than southerly light which can create extreme shadows and cause issues for those with visual disturbances. Light from clerestory windows can be beneficial, reducing visual information at lower levels, particularly useful if surrounding views are distracting.
- (2) Add light shelves to diffuse any direct light from the south.
- (3) Avoid roof lights or glass-roofed conservatories which can amplify the sound of rain.

7.9 Sensory and acoustics

- (1) A quiet location for accommodation is important, away from main roads, trainlines, flight paths, busy public venues etc.
- (2) Selecting a quiet neighbourhood should be a primary objective, giving residents a fighting chance of coping with the world around them. Provide good access to quieter areas, countryside, or woodland walks.
- (3) Living walls. The addition of living walls straddling external thresholds, can help to dampen sound as well as providing a visual wayfinding constant and a gradual introduction of outside to inside to assist transitioning.
- (4) Add acoustic panelling or canopies to high spaces to reduce echo.

7.10 Sensory and a sustainable approach to living

- (1) Any buildings ought to be as sustainable as viable with a brief of this complexity. Use natural materials which are non-polluting/nontoxic, particularly in case any residents have Pica e.g. eat glue in carpets, putty out of windows. Passive ventilation/bris de soleil could help maintain a more constant internal temperature and could be utilised instead of air conditioning units (Pfeiffer *et al.*, 2017), which can be problematic for those with noise sensitivities or with body temperature control issues.
- (2) Provide the opportunity to create further tasks, such as:
 - harvesting of rainwater to water plants and feed pets/animals;
 - recycle kitchen and green waste in a wormery so that the compost can be spread on an allotment.

7.11 Sensory and a sense of community

- (1) The location of any accommodation needs to be within a strong existing community who can support autistic adults when they are out and about, through social

interaction and communication and any social enterprise activities (Song *et al.*, 2021). Good access to a high street/shopping area/farmer's market, local public amenities, transport links and their families (Nguyen *et al.*, 2020b). Avoid locating in areas with transient populations.

8. Discourse and feedback on live digital student presentations

8.1 Sample feedback from professionals at LCC

I sit in front of designers and architects who are bringing schemes to us, and I have not seen or heard anything from them that is as good as what I've heard from yourselves and that's absolutely the truth of the matter. Meaningful purpose has come through so strongly. I've written it down five times just because I want to hear that from them. I'm going to be putting it back to them and saying: tell me whereabouts in this design you have put meaningful purpose in this person's life and that's just been brilliant to hear from you. Excellent. Anna Clifford, Programme Manager Service Transformation, Adults and Health

All presentations today have got to the core of what LCC is trying to do in terms of our commissioning, so really focusing on how the projects integrate within the community. Liam Brook, Senior Project Officer, Service Transformation, Adults and Health

We regularly work on large scale projects with very large teams of experienced consultants. Architects who've 20–30 years' experience in practice and very few of them come up with as considered designs and presentations as today's. Daniel Kinghorn, Principal Design Officer, City Development

Quite a playful approach to something but also real issues for this user group so yes I thought it was really good. Good use of precedent images to portray your ideas alongside your own sketches and models. Abbey Forster, Senior Design Officer, City Development.

8.2 Sample feedback from autism experts

What we need to focus on is people's happiness, engagement, and quality of life. I liked that the student projects, had those values throughout, all the way through from the start to the end. PBA

They have kept it meaningful and purposeful and liveable as well which I think is always important. OT

8.3 Discourse and critical pedagogy with LCC professionals

The students learnt, from the client's broad overview of design for specialist accommodation, that there are many links between autism-friendly design and design for dementia. The C-shaped raised "hug vegetable beds" were designed for autistic adults with proprioceptive dysfunction, with problems in locating their body in space but would equally be beneficial for wheelchair users who struggle to reach out too far across a surface, or users who need the security and direction of a wraparound space.

Other links with design for dementia which were discussed include:

- (1) Spaces with a clarity of purpose
- (2) Clear circulation routes
- (3) Visual constants for reassurance
- (4) Purposeful activities in the home environment, particularly in times of lockdown, or when residents are too confused to go beyond safe predictable environments

8.4 Example of discourse between autism experts

Student design idea: wavy, neutral felt acoustic ceiling baffles introduced to reduce acoustic issues over certain activities, in a double height space. Feedback: SBA said that 99% of the young people he works with have hearing difficulties. SBA worried that the forms might be too visually disturbing, but OT said that the main issues with visual disturbances are forms that move or are mirrored or reflective surfaces. OT does not think that there are issues with forms which are static.

The project evidences the value of sharing knowledge, ideas and discourse not only with experts in the field but also professionals who commission services; “trans-disciplinarity can be elucidated as a form of learning through action involving co-operation among different parts of society, professionals and academia in order to meet complex challenges of society” (Maturana *et al.*, 2021).

8.5 Sample feedback and the student experience

Having the opportunity to present to professionals who work in the field of autism meant that we not only gained immediate feedback on our projects, but also an understanding of the importance of presenting to those (clients) who are not designers. Student 1

Working alongside professionals within the field of autism and associated learning disabilities gave me the chance to discuss designing but on a deeply empathetic level and I now feel very informed on the subject. Being able to work so closely with my tutor and have her continually offering support and providing in-depth resources has helped me to fully understand the core principles of autism-friendly design and behaviour informed design.

The project ended with a fantastic opportunity to present to autism professionals, who are very positive and proactive when speaking about the sensory issues, autistic people face. It was interesting to then have feedback from two health professionals who do not specifically just critic the design, they offer an opinion based on their knowledge and skill set. I know from this project I now understand the importance of continually assessing, reflecting and problem solving when developing a design which is inclusive for all people. Student 2

9. Challenges and opportunities of teaching and learning in two lockdowns

9.1 First lockdown

The first time the studio project transferred to entirely online was just as the concept phase of the project commenced. The transition to distance learning took place over one week in a state of extreme urgency in an environment of national panic. A fine balance for tutors is between inspiring and driving the students forward and showing a respect and understanding towards the increasing anxiety levels which many students experienced.

9.2 Mitigating mental health issues in a pandemic

Tutor’s approaches, tailored to individual student’s situations:

- (1) Regular signposting to counselling and mental health support.
- (2) Heightened empathy, nurturing and positivity, particularly towards students who were “frozen” with their work.
- (3) Expressing an enhanced “can do” attitude at every stage of contact to counteract some students who struggled to imagine how they could continue their studies under government COVID-19 restrictions.
- (4) Referencing individuals’ good student work produced prior to the pandemic.

- (5) Establishing coping strategies by taking small steps through fortnightly online review presentations to help students realise that they can only become more resilient if they face stress and anxiety head on (Vermeulen, 2014), in this case presenting live online to a group of autism experts and professionals from LCC.

9.3 *Teaching approaches which worked well*

- (1) Spontaneously adding the requirement to design spaces to respond to COVID-19 including social distancing, hygiene and use of materials with natural anti-microbial properties. This added a level of interest which was real, socially relevant and engaging. It succeeded in refreshing students' projects and emulates design practice.
- (2) Enabling students to view the situation as an opportunity to play to their strengths and think differently, a designer's attribute e.g. "Necessity is the mother of invention" (Franck, 1658).
- (3) Seeing the potential in easily accessible "Found materials". Unexpected materials can be used for hand drawing and model making e.g. recycled food packaging.
- (4) Sharing and discussing online, in parallel to teaching, a series of nine new mini visual lectures containing photographs of past student examples. This replaced tutorials in studio with past examples of real 3D models and 2D design work.
- (5) Reduced scrutiny of the making process, as students were not physically handing in work.
- (6) Utilising digital submission meaning that all images can be carefully manipulated through photography and Photoshop to enhance work.
- (7) Time management: students can work up until the last minute, as they will not have any time-consuming printing to manage.
- (8) More thoughtful student planning and preparation prompted by online studio tutorials. Students need to photograph their work, compose their images digitally and upload images to their desktops to share online, rather than simply placing their work into their bags and portfolios.
- (9) Increased flexibility around how work is communicated e.g. if freehand drawing is preferred or more accessible than digital software, then this can support model making and vice versa.
- (10) The introduction of axonometric drawing as an alternative means of expressing final designs if access to model making equipment and materials is limited.
- (11) An option of making a short film to walk tutors around students' final models.
- (12) A2 portable drawing boards loaned out to students to support them with distance learning.
- (13) The option of recording a voiceover presentation rather than a live delivery.
- (14) Opportunities for model making and hand drawing achieved a heightened importance with students, indicating the value they placed on these forms of communication (Alnusairat *et al.*, 2020).
- (15) Self-motivated students coped well even when they had limited space and provision for model making.

9.4 Teaching approaches which worked less well

- (1) Many students needed several weeks to adapt to distance learning and associated new technologies – an unexpected outcome from a digital generation.
- (2) Reduced opportunities for serendipitous, impromptu conversations e.g. waiting for the lift, made peer-to-peer learning and socialisation much more challenging.
- (3) Students who chose to return home and whose home environment was not conducive to distance learning, e.g. poor Internet connections, young siblings in the house, were disadvantaged.
- (4) The project did not face the ethical issues of face-to-face contact with autistic adults; therefore, no risk assessments were required, but this did reduce the extent to which the autistic voice was heard.

9.5 Review of assessment

- (1) A university-wide 4-week time extension was granted, affecting the programme of delivery and distorting student impetus. A 2-week time extension would have been more appropriate.
- (2) Assessment shifted from a 100% live “pin up” submission of 2D and 3D design work in studio to hybrid submission. Face-to-face students presented their models and drawings live in studio, having uploaded their research and digital work (via PowerPoint) to their online learning environment, which was then presented live on the main studio screen. This avoided social distancing and hygiene issues involved in printing work. This hybrid presentation approach worked well and could be continued post-pandemic.
- (3) Distance learning students presented their work via a live digital presentation (through PowerPoint). Under the circumstances, this was successful although the students were heavily reliant on good photographic and digital skills to communicate their models and drawings effectively.

9.6 Second lockdown, mitigating mental health issues in a pandemic

Successful strategies used in the first lockdown were applied again and, once government lockdown recommendations were reduced, two teaching options were provided:

- (1) Blended delivery. Reintroduced to allow for some face-to-face studio learning, socially distanced student-to-student contact, tutor and peer support and to encourage those learners who find it challenging to learn 100% remotely; or
- (2) 100% distance learning. Continued for students shielding, self-isolating and/or with anxiety/mental health issues. No written evidence was required to support this choice, and students could choose when and if they wanted to return to blended learning.

A review at the end of the academic year revealed a take up of counselling and mental health service below that anticipated; waiting lists are too long. Tutor colleagues become the invisible front line for student mental health.

9.7 Teaching approaches that worked well

- (1) To help emulate design practice, the project emphasised how learning through joint working with professional teams, as well as peer groups, is imperative. Dedicating

time to understanding human behaviour and the sensory environment enables students to apply a deeper level of critical thinking and problem solving to design projects.

- (2) The reintroduction of blended teaching after Easter 2021 meant tutors could show live examples of past student work in studio, forge stronger relationships across the year group to create a vibrant environment, increase the social opportunities between students and provide more opportunities for peer-to-peer learning.
- (3) Two new supporting lectures were of real value: “Recap on Plans and Sections” and “Design Development and Process”; both helped students to understand drawing techniques and approaches to designing circulation routes more effectively.
- (4) New bite sized Photoshop “Visuals” pre-recorded online demos supported students with their atmospheric sections and working up photographs of their final models. Moving forward, these demos form an invaluable resource.
- (5) Uploading stronger sample student “work in progress” fortnightly into the “Student Gallery” on the online learning environment was a useful resource, particularly for students working 100% remotely.

9.8 Teaching approaches that worked less well

- (1) The double module format (by which the project stretches across two learning modules) meant some distance learning students struggled with motivation, having limited face-to-face inputs over a longer time-period.
- (2) A proportion of students found it challenging to visualise spaces because, unlike in previous years, there were no live project site and case study visits in the second year of the project. This also meant some students were slightly less invested in the importance of the societal issues which are encountered with a live project of this kind. The impact of rising levels of student anxiety surrounding the pandemic was evident.
- (3) The second lockdown had a greater impact on first-year students as they had never met their peers on campus under normal circumstances, only behind a mask, socially distanced in bubbles, or online. This made social engagement and peer-to-peer learning very challenging.

9.9 Review of assessment

- (1) As for the first lockdown, hybrid presentation was adopted. This worked well, but students tended to drop more design precedent images into the digital format than is needed for a final presentation. When printing work, students are more selective.
- (2) The use of both the main studio lectern computer and a mobile projector to present students’ supporting digital work allowed students to learn from the work presented by both groups, whilst socially distanced.
- (3) The ease of applying for a 2-week time extension, self-certifying rather than requiring a doctor’s letter, meant that a few students were less focussed by deadlines and became over reliant on this option, which reduced impetus.

10. Reflection

The major problems facing our world today can only be solved by improving our knowledge and understanding of behaviour (Skinner, 1958). The value of knowledge gained through experience and learning became apparent at an early stage of the project, for instance when exploring the requirements of autism accommodation. This included understanding previously gained by the tutor over a 7-year period researching autism-friendly schools. Similar issues with transitioning (Love, 2019), over stimulating environments and the need to keep autistic people occupied are a common theme.

Learning how to communicate our ideas in a clear and uncomplicated manner, means that we can take these skills and use them in future professional jobs. The confidence which I have gained by doing this is something which I am really grateful to have taken away from this project. Student 1

10.1 Future directions

The *Ten Novel Sensory Living Themes*, similar but different from the *Ten Novel Spatial Transitioning Platforms* (Love, 2019), require deeper research to enable them to become a replicable methodology and prototype for practice.

Owing to the extreme UK shortfall of autism accommodation, researchers and practitioners are presented with an opportunity to make a difference. However, the tutor, as specialist consultant, established two important concerns which could create setbacks to future projects:

- (1) Councils can have regularly changing project teams, meaning projects are prone to revisions or unintentional disregard of design motivations; the designer can inform one team about autism-friendly design, but subsequent teams must be kept informed to embed fully the “Sensory Living Model”.
- (2) Local councils’ selection criteria for a site may prioritise cost effectiveness and availability within their existing building portfolio, rather than “fit for purpose”. This heightens the imperative for students and practitioners to prepare their site analysis from the viewpoint of autistic adults with sensory sensitivities, emphasising the need for a quiet location and a supportive community (Brand, 2010).

11. Conclusion; more than just defining scope and schedule

Local authorities have a responsibility to prevent inappropriate seclusion and need to commission specialist autism-friendly design so that autistic adults can be fully included in communities. The broken government promises (HM Government, 2012; NAS, 2021a) and lack of urgency surrounding this provision is disturbing and exasperated by COVID-19.

Through collaboration between a local authority and a university with specialist autism research expertise, the “Sensory Living Model” not only helps to achieve autism-friendly accommodation provision but also teaches our budding designers to create new narratives and original forms involving a deeper level of critical design thinking and problem solving; “health is an integral component in the production of architecture” (Maturana *et al.*, 2021).

Three main lessons from working on this “live” distance learning project are

- (1) The role of the designer as an advocate for vulnerable populations, who may not have their own voice, is imperative, particularly when formulating an autism-centred design brief and schedule of accommodation, as no two users’ needs are the same.

- (2) Reduced face-to-face tutor contact and peer support can assist students to become less reliant on extrinsic motivators. Learning how to be resilient and have intrinsic motivation is good preparation for design practice.
- (3) The online design studio can be a place of effective learning, but educators need to persevere at keeping design relevant and student-centred (Salama, 2009) bringing the real world into the digital world.

Entwined in the study is the creation of a working or “continuous learning environment” in the homes of autistic adults; this helps address some issues concerning future pandemics and new living or working styles. The project embeds a “better normal” (Maturana *et al.*, 2021) which includes a level of flexibility or choice, not only for social distancing but also for autistic residents with different hypo- and hyper-sensory needs and diverse interests e.g. accommodating a choice of a quieter option with two living spaces, two kitchens and two dining spaces.

The importance of providing autistic people with the opportunity to access a “micro family community” and develop their skills and contribute to society (Povey, 2021) is paramount in their happiness and quality of life (Vermeulen, 2014). Responses to The National Autism Strategy need to be innovative, so that they can address how to support autistic people to lead meaningful lives (HM Government, 2021, p. 17).

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