

The ASD Friendly Classroom – Design Complexity, Challenge and Characteristics.

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Abstract

As architects and designers we have a responsibility to provide an inclusive built environment. For the Autistic Spectrum Disorder (ASD) sufferer however, the built environment can be a frightening and confusing place, difficult to negotiate and tolerate. The challenge of integrating more fully into society is denied by an alienating built environment. For ASD pupils in a poorly designed classroom, their environment can distance them from learning. Instead, if more at ease in their surroundings, in an ASD friendly environment, the ASD pupil stands a greater chance of doing better.

This paper sets out the triad of challenges faced by designers when considering the ASD friendly environment and then examines lessons to be learnt from 9 studied ASD friendly classrooms in a Northern Ireland context. The objective is straightforward. By increasing the awareness of the ASD friendly classroom it will hopefully facilitate greater inclusion of the ASD pupil into mainstream education and society at large.

Keywords

Architecture; Autism; Children; Design; School Environment

Autism Spectrum Disorder (ASD) is a term that covers the many sub groups within the spectrum of autism. Autism can be termed as a lifelong complex developmental disorder. It is characterised by a triad of qualitative impairments in social communication, social interaction and social imagination. (Wing & Gould, 1979) In addition to these problems, sufferers often struggle with sensory sensitivity to visual, auditory, tactile, proprioceptive, gustatory and olfactory stimuli. (Hinder 2004) The range of the spectrum is such, that while some sufferers may be able to live relatively independently, others will require lifelong continuous support.

Accordingly, one of the very difficulties for the ASD sufferer can be to simply feel at ease in their own environment. For such people, the built environment can become difficult, confusing and even threatening. (Grandin, 1995; Harker & King, 2002; Williams 1998)

For architects and designers, this is indeed a stark reality. The architectural profession has long been entrusted with the duty, responsibility and privilege to provide a built environment that will promote well-being, be inclusive and enrich life. By contrast, the disorientation and fear experienced by many ASD sufferers is very far removed from this ideal and greatly distances them from the possibility of feeling the "pleasure and protection when the body discovers its resonance in space." (Pallasmaa, 1996, p.67)

To add to this concern is the fact that recent statistics suggest that the incidence of ASD is on the increase and even growing at alarming levels. The UK National Autistic Society has put the

current incidence of ASD at around 1% of the population. In Northern Ireland recent figures match this. In an interview with Martin Clarke, the Principal Educational Psychologist of the Belfast Education and Library Board (personal communication, April 14, 2009), he gave the following statistics. At that time he stated, there were 283,803 pupils between the age of 5 and 16 in Northern Ireland. Of these, 1.2 % had a diagnosis of ASD. 63% were educated in mainstream schools, 16% in special schools and 21% in special language, learning disorder and autism support units.

Despite this, ASD has so far, been largely ignored by the architectural profession. In the UK there are no specific guidelines when considering ASD. Those guidelines that do make mention of ASD, tend to do so in general terms only and in less detail than other learning difficulties and special needs. With regard to the school environment, the 2005 publication *Evaluating Provision for Autistic Spectrum Disorders in Schools*, co-authored by the Department of Education in Northern Ireland and the equivalent An Roinn Oideachais in the Republic of Ireland outlines three-performance indicators for consideration. These are that,

- 1 The learning environment is supportive of the child with autism: lighting, sound and colouring are sufficient to encourage the child to relax and settle to work.
- 2 There is sufficient personal space for the child with autism to find comfort and to distress when necessary.
- 3 The learning environment contains areas of high interest to reflect the particular interests of the child with autism.

Similarly the recently 2009 published UK government Building Bulletin 102 (BB102) *Designing for disabled children and children with special educational needs*, lists the design issues for children with ASD as;

Simple layout: calm, ordered, low stimulus spaces, no confusing large spaces; indirect lighting, no glare, subdued colours; good acoustics, avoiding sudden / background noise; robust materials, tamper-proof elements and concealed services; possibly H&S risk assessments; safe indoor and outdoor places for withdrawal and to calm down. (DfEE, 2009, p.199)

The widespread exclusion from, or when included, the general nature of the design considerations listed in the current guidelines is in no doubt due to the difficulties and challenges presented when dealing with a spectrum of disorders. (Khare & Mullick, 2008; Mostafa, 2008; Young, 2004). Not only may sufferers exhibit different sensitivities and personal difficulties, the severity of these too can vary. In effect, the design parameters are fluid and variable. There is of course the danger when dealing with autism, that prescriptive design guidelines or single rules will not take into account variations among sufferers and their different levels of ability. Therefore, the challenge is both complex and difficult. But the need to confront these difficulties is huge. This, it could be argued, is especially true in a school setting. Feeling ill at ease in the classroom environment can hamper learning, thereby further alienating the ASD sufferer in society.

Design Complexity and Challenge

With regard to the classroom (environment), the ASD sufferer and writer Donna Williams outlined her ideal environment as;

..one where the room has very little echo or reflective light, where the lighting was soft and glowing and upward projecting rather than downward projecting lighting. It would be one where the physical arrangements of things in the room was cognitively ordered and didn't alter and where everything in the room remained within routine defined areas. It would be an environment where only what was necessary to learning was on display and there were no unnecessary decorations or potential distractions. It would be one where nobody unexpected would enter without everyone getting a cue and processing time to expect the change. (Williams, 1996, p.284)

This description helps illustrate the many concerns the writer had when at school. She makes the case for constancy, structure, with neither the unexpected nor superfluous. In many ways, Donna Williams is advocating a potential solution for classroom design for the ASD pupil. If designing for the 'worst case scenario' then all children would be catered for on the autistic spectrum. Why not have a classroom environment that is totally calm, quiet, without distraction and enclosed from external influences. Would that not constitute an inclusive design solution?

However if we consider inclusive design as **better design** this is not the case. The classroom is a learning environment for life, a place of preparation for the challenges and negotiations we all face in our everyday life. Cocooning the ASD pupil from all external factors will not necessarily help them reach their full potential in life. Maximising a pupil's ability to cope with change and external factors is an important and vital consideration for teachers in the ASD classroom.

Therein lies the most difficult challenge for the designer when dealing with the ASD pupil in the classroom – that of trying to provide an environment where change can be introduced, where the ASD pupil can be challenged, encouraged and supported to maximise their potential. Dominic Cullinan, makes this point stating;

A recent seminar for teachers at the Institute of Education, looking at the relationship between buildings and behaviour, explored the idea of designing spaces specifically for children with autism. Underlying the discussion was the belief that certain criteria could hold true; setting a desk facing a blank white wall, for example, might give the child the visual calm they need for concentration. However, it was also argued that such spaces do not help the child learn to live in the world at large. This refinement neither helps the child to cope, nor those who support them. (Cullinan, 2009, p.51)

So in effect, just as the ASD sufferer has a triad of impairments to contend with, so too do we as designers, have a **triad of challenges** to overcome. Not only are there the challenges firstly of the differing severity of the autism inherent within the spectrum and secondly the varying and differing range of sensory difficulties of individual ASD sufferers to contend with, there is the third difficulty in the classroom setting to consider – how best to promote and bring change and subsequent independence for the ASD pupil in that environment. Overcoming the triad of challenges for designers will hopefully then allow, in a school setting, the design of the best possible and most appropriate learning environment that will aid in pupil performance. With

increased pupil performance and corresponding ability to cope with the challenges of their environment, the ASD pupil is more likely to manage to integrate more fully into mainstream education and society in general.

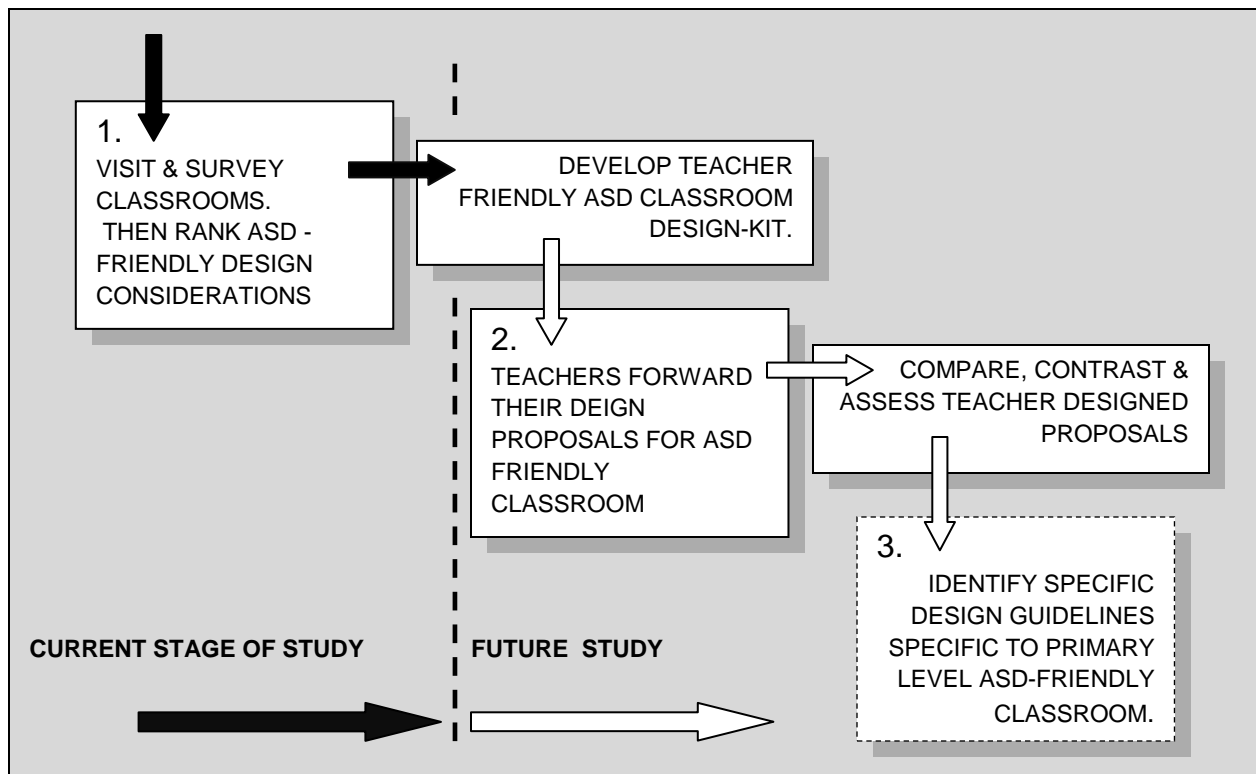
The Study

There is widespread consensus that an appropriate classroom environment will aid the performance of the ASD pupil. (Khare & Mullick, 2008; Whitehurst, 2006a) Therefore, this study seeks to identify what environmental factors and considerations contribute most to the ASD friendly classroom. It will be carried out in two stages. In this the first stage, 9 ASD friendly classrooms were visited, surveyed and the teaching staff asked to rank and give consideration to a number of autism friendly design criteria for the classroom. It is these results that are represented in this paper.

This, the first stage of the study, will then be followed by a future second stage where the teaching staff will be asked to design their ideal ASD friendly classroom environment. This will be in an attempt to further evaluate the environmental and built design considerations in an ASD friendly learning environment.

Ultimately it is hoped that this will then facilitate a third stage when ASD-friendly guidelines and design considerations specific to the primary level classroom will be developed.

Table 1 – Proposed Study Stages



In 2005, as a response to the report *Evaluating Provision for Autistic Spectrum Disorders in Schools*, (DoE(NI) 2005), the Northern Ireland Southern Education and Library Board (SELB) implemented a scheme where existing school accommodation in ten different schools would be converted and refurbished into ten ASD friendly classrooms. The SELB is currently one of 5 Education and Library Boards covering Northern Ireland. It spans 1,450 square miles and is responsible for providing education for 75,000 pupils in an overall population of 322,000 residents in its area. Refurbishment and conversion of the classrooms took place in 2005 and 2006.

This means that after three or four years working experience in the classrooms, the teaching staff have had time to formulate their opinions and evaluate the effectiveness of the interventions. All ten of the class refurbishments were carried out in mainstream schools, nine at the Key Stage 1 level (age 5 – 8) and one at Key Stage 3 level (age 12-16). Moreover because the conversions to ASD friendly classrooms were taking place in existing accommodation and were not new build solutions, it afforded the opportunity to better understand what worked and what did not work since, by their very nature, the refurbishments and conversions were in some ways constrained by existing the structure and fabric of the former accommodation. Also, because 8 of the 10 conversions were done in previously used mainstream classrooms, it might facilitate with the consideration of transfer of ASD friendly criteria into the mainstream classroom. If this was the case, it might aid in ASD pupil integration or transfer into the mainstream classroom.

To compose a set of criteria for the ASD friendly classroom teachers to rank, existing available literature was appraised (Harker & King 2002, Humphreys 2005, Whitehurst 2006, Mostafa 2008, Vogel 2008,) 16 design criteria for ranking were then compiled. These consisted of combining the 8 considerations detailed by Vogel (2008) in *Classroom Design for Living and Learning with Autism*, with 8 of the less classroom specific criteria suggested for consideration by Humphreys in *Autism & Architecture* (2005). For purposes of comparison and understanding afterwards, the 16 chosen criteria were broken down into four category bands – control and safety, classroom character, classroom usage and classroom physical factors. These are listed below in Table 2. To allow further analysis, a checklist of factors was also developed, based largely on Tufvesson & Tufvesson (2007) and used to gain a greater understanding of each classroom environment visited. This is shown in Table 3.

It was decided at an early stage not to interview the children, but instead the teachers. This was done for three reasons:

- 1 As commonly noted (Khare & Mullick, 2008; Tufvesson & Tufvesson, 2007, Woodcock, Georgiou, Jackson & Woolner, n.d.), because of their disability, ASD-suffers can find it hard to communicate freely.
- 2 The age of the majority of the children, 5 to 8 years old, would render objectivity extremely difficult, and
- 3 As noted by Whitehurst (2006b) – environments designed for the ASD sufferer not only impact upon the sufferer but also for the teacher / carer. An environment where staff too can feel at ease is extremely important. That too can have a profound effect on the ASD

sufferer. As highlighted by Plimley (2004), autism friendliness is a combination of both a human component and the built environment.

Staff were asked to score each of the chosen sixteen classroom criteria in terms of importance from 1 (low) to 5 (high). All classrooms were visited at the end of the day when the children had left for home. On each occasion, when asking the teachers to score the classroom criteria, the order of the criteria for consideration was randomly selected.

Table 2 – Design Criteria for ASD friendly classroom. (H -after Humpreys, V after Vogel)

		Classroom Criteria	Brief Description
CONTROL & SAFETY	H	CONTAINMENT	Secure boundaries to stop the child running off or getting lost.
	H	GOOD OBSERVATION	To put staff and helpers at rest without infringing upon pupil's space.
	V	SAFE	Both in terms of physical and emotional safety. ADS-children commonly have little concept of danger.
	V	NON-THREATENING	A restful and secure setting to help foster encounters and relationships.
CLASSROOM CHARACTER	H	SENSE OF CALM + ORDER	Complexity can cause stress. For the ASD sufferer, this can be especially upsetting and confusing.
	H	GOOD PROPORTION	Might the sensory sensitive ASD sufferer find well proportioned space inherently more comfortable.
	V	NON-DISTRACTING	To decrease the chance of sensory overload for the ASD pupil.
	H	PROXEMICS (PERSONAL SPACE)	Many ASD sufferers need more 'personal space' around them or they can feel threatened.
CLASS USAGE	V	FLEXIBLE + ADAPTABLE	An ability to adjust the classroom to suit the ASD pupil's needs
	V	CONTROLLABLE (FOR PUPIL)	A degree of choice for the child to help promote independence
	V	PREDICTABLE	Clearly legible for the ASD pupil who is often reliant upon visual cues.
	V	NON-INSTITUTIONAL	Not sterile but welcoming and comfortable. A place where the ASD pupil can relax.
PHYSICAL FACTORS	V	SENSORY-MOTOR ATTUNED	Providing a range of sensory experiences in the classroom
	H	GOOD QUALITY ACCOUSTICS	Many ASD sufferers can be sensitive to noise and find it difficult to differentiate between different sounds.
	H	NATURAL LIGHT	The use of natural daylight in preference to artificial lighting.
	H	REDUCTION IN DETAIL	Both in terms of reduction in detail and palette of materials. ASD sufferers can get absorbed in minutia.

Table 3 – Survey Checklist for Classroom Visit

CLASSROOM		PHYSICAL FACTORS		INTERIOR	
	LENGTH	VIEW	BACKGROUND		PLANTS
	WIDTH		BUILDINGS		AQUARIUM
	SHAPE		GREENERY		QUIET SPACE
	HEIGHT		SKY		SENSORY SPACE
	No. of DOORS		PLAYGROUND		COMPUTER(S)
	No. of WINDOWS		NO VIEW		WALL DECORATION
	% OF GLAZING				SHELF STORAGE
	ORIENTATION	NOISE	INFILTRATION		BOX STORAGE
			EXTERNAL		CUPBOARDS
FINISHES	FLOORING		BACKGROUND		COLOUR
	HEATING	LIGHT	SUNLIGHT	EXTERNAL	
	CEILING		DAYLIGHT		
	LIGHTING		ARTIFICIAL LIGHT		ACCESS ARRANGEMENTS
		SENSES	SMELL		PLAYGROUND
WINDOWS	CURTAINS		TEXTURES		DINING
	BLINDS		PATTERNS		GARDEN
PLUS	NUMBER OF STAFFIN CLASSROOM – TEACHERS & CLASSROOM ASSISTANTS				
	NUMBER AND AGES OF CHILDREN IN CLASS				
	TEACHING METHODS EMPLOYED – ONE TO ONE; GROUP; BOTH				
	POSITION OF CLASSROOM IN RELATION TO REST OF SCHOOL				
	WC PROVISION FOR CHILDREN				
	PREVIOUS USE OF ASD FRIENDLY CLASSROOM				
	ANY SHARED CLASSES WITH THE REST OF SCHOOL				

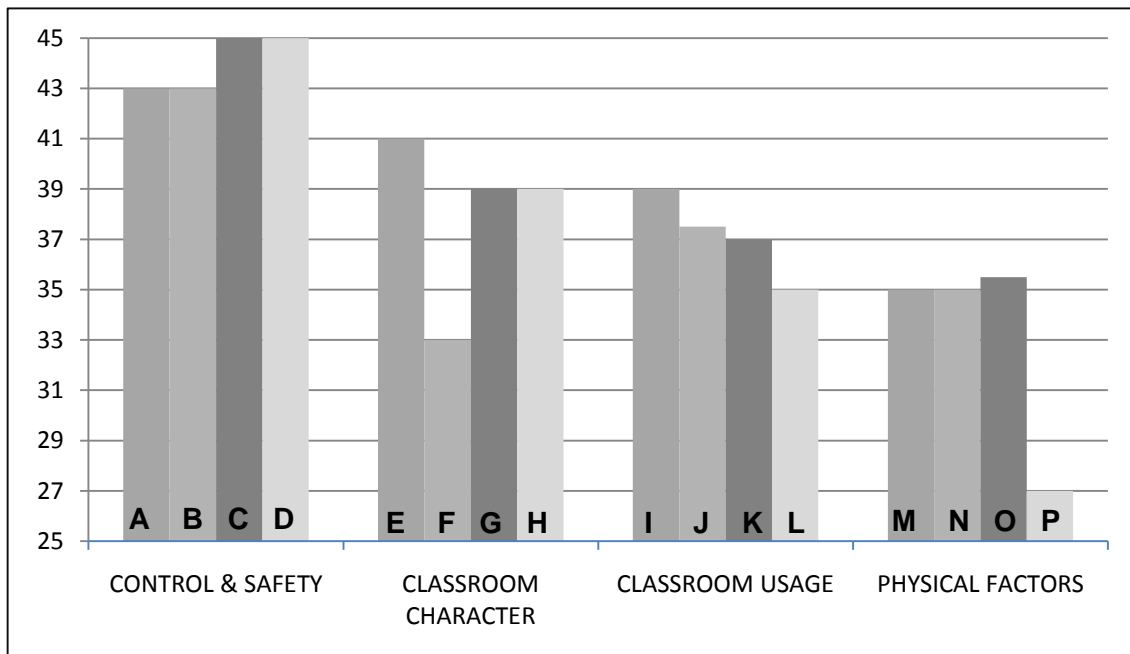
The Study Results

Between November 2009 and January 2010, nine of the ten ASD friendly classrooms in the SELB region were visited and their staff interviewed. Interview results were recorded and then combined together under the headings of the sixteen ASD friendly classroom criteria. The results are shown below in Tables 04 and 05. The results will now be further expanded in turn under the four category headings of control and safety, classroom character, classroom usage and physical factors.

Table 4 – Ranking Scores for ASD Friendly Classroom Criteria.

	Classroom Criteria	Score (out of a possible 45)
Control & Safety	A. CONTAINMENT	43
	B. GOOD OBSERVATION	43
	C. SAFE	45
	D. NON-THREATENING	45
Classroom Character	E. SENSE OF CALM + ORDER	41
	F. GOOD PROPORTION	33
	G. NON-DISTRACTING	39
	H. PROXEMICS	39
Classroom Usage	I. FLEXIBLE + ADAPTABLE	39
	J. CONTROLABLE	37.5
	K. PREDICATABLE	37
	L. NON-INSTITUTIONAL	35
Physical Factors	M. SENSORY-MOTOR ATTUNED	35
	N. GOOD QUALITY ACCOUSTICS	35
	O. NATURAL LIGHT	35.5
	P. REDUCTION IN DETAIL	27

Table 5– Bar Chart of Ranking Scores for ASD Friendly Classroom Criteria.



Factors of Control and Safety

Perhaps unsurprisingly, it was the criteria concerned with pupil safety and teacher control that scored most heavily in terms of importance overall. Regarding pupil safety, it was stressed that sharp edges and angles should if at all possible be avoided in the classroom. Climbing opportunities should be limited - bookcases, shelving and radiators are all likely candidates for climbing opportunities. The bookcases and units favoured by staff to sub-divide the classroom into different zones are potentially troublesome in this regard.

To aid with containment, most doors in and out of the classrooms were fitted with double handles, one at normal height and one at high level out of the reach of the children. Both had to be turned for the door to open. Of the 9 classrooms surveyed, 7 had direct access to adjoining WC facilities. For the 2 that did not, it meant staff had to leave the classroom to accompany the pupil to the WC. This was seen as a major disadvantage. A clear benefit liked by the staff where in operation, was direct access to a secure external play area. This could be used as a reward, as an incentive, for external teaching or for pupils unwilling to join larger numbers in the school playgrounds. It was also stressed that accessing playgrounds was best done over a small distance and that at all times the playground must be secure.

The importance of pupil observation was stressed. This was not only to help evaluation of the child in the classroom but also to prevent any pupil 'meltdowns' if the pupil was growing agitated or distressed. To this end, 2 of the classrooms visited had their quiet withdrawal space actually in the classroom, separated from the teaching and play spaces by fixed 1450mm high partitions behind which the children could withdraw into tents or fabric tunnels. Separate quiet areas accessed directly off the classroom commonly had glazed vision panels into them.

To aid with a non-threatening environment, easy access for the pupils to their visual timetables was stressed as essential. To facilitate with this it was preferred if possible that a separate cloakroom area outside the classroom or in the classroom if space allowed, be provided. Having the cloakroom area in a main corridor outside the classroom was not felt to helpful – ASD pupils benefit from 'transitional space.' This is very true for the transition from the hustle and bustle of the school circulation space into the classroom itself. In this regard, a well considered cloakroom area for coat and shoe storage can help.

Factors of Classroom Character

Regarding the character of the classroom, having an environment of calm, order and simplicity was ranked highest. (see Table 3) This was felt by staff to be most critical around the children's individual workstations when demands upon concentration would be highest. There, pupils have screened, separate cubicle-like workstations with minimal possible visual distraction. When able to cope in that environment, pupils would then be encouraged to work alone at a desk and if able to cope with that over time, would be encouraged to work at a group desk or table. To aid in this, a clear structure within the classroom is important.

The importance of having a non-distracting environment varied dependent upon what areas of the class were being considered. In the pupils' workstations, it was considered vital, less so in other areas. What was consistent however were the similar comments regarding what was most difficult for staff to combat in terms of visual distraction in the classroom. The necessary

flexibility of being able to move or screen off the visually distracting computer(s) in each room was not possible with the fixed surface mounted radiators and pipes occurring in 8/9 of the classrooms. Even worse was the one instance where the classroom was fitted with recessed blow heaters. These proved to be both noisy and uncomfortable to be near. Furthermore, the grills provide an opportunity for the pupils to play with them.

The distractions of views-out were best dealt by having blinds or curtains in the classroom. Two of the classrooms kept the blinds closed at all time being described by one teacher as 'the only way.' Others closed the blinds when necessary. What was clear was that if low level curtains or blinds were closed, staff in classrooms with high-level clerestory glazing really appreciated having a visual connection to the exterior and the natural daylight that brought. However, orientation of windows was also a factor as direct sunlight entering the classroom was problematic.

The need for the pupils to have extra personal space in comparison to other pupils was recognised. To this end the maximum number of ASD pupils in each classroom was eight. One teacher and two classroom assistants accompanied this.

Less important to the staff was the concept of proportion. This is due in part to its very qualitative and subjective nature. Interestingly, the teachers whose ASD classroom had previously been diagnostic and learning disorder accommodation and therefore consisted of a collection of rooms of differing sizes rather than one primary classroom, reported that the children's behaviour was different in different room volumes – the children tended to be calmer in smaller rooms. This is an observation shared by Myler, Fantacone & Merritt. (2003) Similarly in the one classroom of differing ceiling heights where the ASD classroom was a combination of former 2350mm high flat ceiling circulation space and a mono-pitched sloped classroom rising from 2670 mm to 4930 mm, the teacher reported that the pupils felt more comfortable in the lower ceiling area (whereas for the staff the opposite is true!)

Factors of Classroom Usage

Concerning the usage of the classroom, the two most common topics of concern for staff were storage and flexibility of classroom layout. The classrooms that were visited were sub-divided into different teaching zones such as work, group, play, computer, reading and story-telling areas. This was commonly done by using screens or shelving and storage units. Having a number of these on lockable castors was of great benefit in quickly changing the classroom layout to suit different needs and also bring change into the classroom. The one major variant from this came from the staff of the one converted Key Stage 03 classroom. Here when dealing with older children and especially boys between the ages of 12 and 16 rather than the 5 to 8 year olds of the other classes, the staff were adamant that furniture needed to be fixed and secured to the floor to prevent the possibility of it being thrown by an upset, physically stronger pupil.

In every classroom, the staff stated that they did not have enough storage. This might well be a complaint from most teachers but in the ASD friendly classroom it can be very significant. Firstly there is the huge range of non-standard equipment used by the pupils. This can include bulky equipment used in occupational therapy sessions or in individual lesson plans. Secondly, clutter

can of course be potentially distracting and tempting to the pupil to access it when not appropriate. It is much better for the staff to have adequate storage so that they can decide what to bring out and when to put on display, again responding to the pupils' needs. This then overlaps with giving the pupils a degree of control in the classroom, important when trying to encourage pupil independence. Having some open shelves or accessible drawers and cupboards can help foster this, if considered appropriate by the staff.

Factors of Classroom Physical Factors

Physical Attributes within the classroom were thought by the staff to be the elements that the pupils could with help and time, come to terms with. Accordingly, they were ranked as the least important design considerations in the classroom. Having good levels of natural daylight in the classroom was popular. However what was raised by staff as a more important issue was the quality and type of artificial light in use. This was especially important if the blinds or curtains were closed. In 8/9 classrooms, the lighting was supplied via fluorescent strip lighting with diffusers to minimise flicker while the other class (in the most recently built school) was fitted with spotlights. In all cases, staff favoured variable lighting rather than the constancy achieved by the lighting systems currently in use. Dimmable lighting, separate lighting circuits and a range of task lighting as alternatives were all suggested by staff. In fact, in some of the classrooms, the staff themselves were using personally supplied free standing task and mood lighting to add contrast to the classroom.

Regarding acoustics, it was noted by all staff that background and infiltrating noise could be distracting for the pupils. However it was also explained that different types of noise could have different levels of impact. For instance, distant passing traffic (especially the sirens of emergency vehicles) could grab a pupil's attention for a short time, as would grass cutting or hedge trimming. However, this was part of everyday life. More problematic was sound infiltration from nearby music classrooms, playgrounds, sports halls or nearby corridors where noise might not only be prolonged but could also vary suddenly in volume. In this regard, the positioning of the ASD friendly classroom within a mainstream school can be an important initial consideration.

Considering sensory-attuned features, the main factor that all staff stressed was the need to have an immediately accessible quiet withdrawal space for the pupils to use if getting distressed or needing to 'recharge their batteries'. These ranged from converted small stores off the classroom, space under an adjoining staircase to the partitioned areas in the class. The two classrooms who did not have these reported it as a major negative. In one case this was because the school had converted their quiet room into a sensory room, something they now in retrospect wish they had not done. This is because a distressed pupil might be agitated and run the risk of hurting themselves on some of the installed lighting and sensory equipment. In the second example, the quiet area was not accessed directly off the classroom, instead via an adjoining link corridor. Therefore the pupil had to be accompanied to the quiet area out of the classroom. All staff expressed the view that they felt the quiet area was more important than the sensory area – the latter was more of a luxury whereas the quiet area was absolutely essential. If needed, staff suggested, if finances allow portable sensory equipment could be set up in a play tent or part of the classroom if required.

Of all the factors considered, it was the minimal detailing in the classroom that was ranked as the least important by the staff. In all the classrooms, the floor covering was a mixture of carpet and slip-resistant vinyl. These tended to be single colours. Geometrical patterns, because of their distracting qualities, always avoided. Walls were painted in 8/9 classrooms, usually muted colours and then used as a backdrop for pupil's work and occasional notice-boards. Having the children's work on view was thought to be very important by the staff as the pupils derived great pleasure from seeing their work exhibited. In the one remaining classroom the internal walls were not painted plaster but instead (as was the case in the majority of classrooms throughout the school) exposed brickwork, this was problematic. The teacher felt the brickwork would be better painted because the multi coloured nature of the brickwork was a distraction for the pupils. Finally, with regard the ceilings in the classrooms that did not seem to be an issue, these either smooth-finish painted plaster or suspended ceiling tiles. The latter were sometimes popular with staff because it allowed them to hang occasional displays easily from the ceiling.

In all cases, staff felt it important that the detailing and finishes in the ASD friendly classroom be as much like the mainstream classroom as possible in order to facilitate into it by the ASD pupil. In short, because the mainstream class had painted walls, work and notice-boards on show, with specific floor and ceiling finishes, as far as possible, so too should the ASD friendly classroom.

Conclusion

It should be stressed in concluding that it is important that not only architects and designers make the decisions for ASD friendly environments, but instead listen to teachers, educational psychologists, therapists, parents and if possible the ASD sufferers themselves. The built environment needs to be more inclusive, particularly when considering the needs of the ASD sufferer. Similarly, the ASD classroom is only one component of promoting integration of the ASD pupil into the mainstream school. The relationship of the ASD classroom within the school is one that needs consideration. The importance of not building something in isolation but 'also repairing the world around it' in order to make the whole more coherent is eloquently made by Alexander (1977, p. xiii)

Both the human and built environment interactions with the ASD pupil can make a meaningful difference. The classroom is an important environment. As the place where learning takes place, it needs to be considered very carefully. It is the environment where progression from more sheltered and protective surroundings can be, with help, peeled away gradually introducing the ASD pupil to greater challenges. This process can be further enhanced by using the school at large, where the ASD pupil can mix with their mainstream colleagues in shared playgrounds, sports, dining and class activities.

But it needs to start with the classroom itself. There, pupil safety and teacher control cannot be compromised. The class needs to be flexible whilst having a sense of calm and order. It is important to recognise the need for additional area in space allocations, both for storage and pupil personal space. Directly off the classroom, WC's and a quiet withdrawal space should be provided. There are benefits to be derived from direct access to an external secure play area. If the classroom is structured into different zones, different qualities of lighting should reflect this. (Beaver, 2006) High level clerestorey glazing is advantageous when curtains and blinds often

need to be closed. Under-floor heating would do away with the need for surface mounted heating. Giving careful consideration to the position of the ASD classroom within the overall school could help nullify the effects of auditory distractions from music, external play and sports.

Conflicts are inevitable, but the potential rewards of initiating genuine change for the better are huge. Well considered and designed ASD classroom spaces can be creative and genuine 'environments for learning.' (Scott, 2009; Vogel, 2008). Recognising the design complexity and challenges involved when considering the ASD friendly classroom is the important first step to towards providing a better learning environment for the ASD pupil.

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Keith McAllister is a Chartered Architect and Lecturer in Architecture at Queen's University Belfast. As the Stage 02 Co-ordinator, he has a deep interest in promoting the design process, an understanding of context and exploration of spatial progression for students in the design studio. His current research projects include Architecture and Autism, Architecture and Special Needs and the promotion of Architecture in the School Classroom. He has practiced architecture in Russia, Italy and the UK and is the extremely proud father of an autistic son.