Developing a Learning Environment Which Supports Children With Profound Autistic Spectrum Disorder to Engage as Effective Learners

Volume I

Tamara Brooks

A thesis submitted in partial fulfilment of the University's requirements for the Degree of Doctor of Philosophy

2010

Coventry University in collaboration with the University of Worcester

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ABSTRACT

To date, research studies and first-hand accounts have combined to provide compelling evidence that individuals with autism experience an array of social and sensory-perceptual impairments which impact upon their ability to succeed within traditional educational environments.

This study employed evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners. The research was carried out at a special school for students with severe and complex learning needs. The Mosaic approach (Clark & Moss, 2001) was utilised to enable students and practitioners to co-construct an evidence-base for the design of their new school. By combining participatory action research including observation of student behaviour and engagement, with a grounded theory study incorporating surveys with significant adults, and specifically adapted methods of obtaining direct student voice, this research identified a wide range of issues which require consideration in order to develop a learning environment which accommodates the sensory-perceptual and social impairments characteristic of autism.

In summary, the findings reveal that specific consideration should be given to the physical environment, social environment and teaching approach and resources. In particular, the evidence from this study suggests that an autism-specific learning environment is one which: (i) reduces sensory aspects of the physical environment, (ii) provides opportunities for sensory regulatory activities and (iii) targets the visual-kinaesthetic learning styles of students with autism.

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In memory of my father Robert Raymond Brooks who was immensely proud when I embarked on this PhD and would have loved to see me graduate.

This thesis is also dedicated to my mother Bella Brooks, for her sage council, patient proofreading and unwavering support.

I would like to extend a further dedication to the students who inspired this project, and all those who I hope will benefit from my findings.

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A special thank you also goes to my sister, Michelle Brooks, who helped whisk this thesis through countless drafts to bound copy – you are the best personal assistant in the world, ever.

Last but not least, I am particularly grateful to the research school for initiating this project and affording me the rare opportunity to see my findings come to life in the new build. And ultimately, I am indebted to the teachers, practitioners, colleagues and friends who contributed their time and knowledge to bring this project to fruition.

GLOSSARY OF TERMS

A&B	Architects and Building
AAC	Alternative and Augmentative Communication
AAC	Augmentative and Alternative Communication Unit
ADHD	Attention Deficit Hyperactivity Disorder
ASD	Autistic Spectrum Disorder
BB	Building Bulletin
BCSE	British Council for School Environments
BE	Building Environment
Becta	(Formerly) British Educational Communications and Technology Agency
BERA	British Educational Research Association
BPS	British Psychological Society
BSF	Building Schools for the Future
CASPER	Code for Active Student Participation and Engagement – Revised
CLDD	Complex Learning Difficulties and Disabilities
DCSF	Department for Children Schools and Families
DES	Department for Education and Science
DfE	Department for Education
DfEE	Department for Education and Employment
DfES	Department for Education and Skills
DoH	Department of Health
E-QUAL III	Engagement Quality Observation System III
ECERS-R	Early Childhood Environment Rating Scale – Revised
Engagement	Within this research, engagement was defined as: 'developmentally appropriate interactions with the environment including materials and people'.
ESCAPE	Ecobehavioural System for Complex Assessment of Preschool Environments
FASD	Foetal Alcohol Spectrum Disorder
fMRI	Functional Magnetic Resonance Imaging
GTC	General Teaching Council for England
HVAC	Heating, Ventilation and Air Conditioning
ICER	Individual Child Engagement Record
ICER-R	Individual Child Engagement Record - Revised
IES	Interaction and Engagement Scale
II	Intensive Interaction
IVF	In-Vitro Fertilisation
IWB	Interactive Whiteboard
Learning Environment	Within this research, the learning environment was defined to include: (i) the physical environment of the classroom, (ii) the teaching approach and resources and (iii) the people in the environment (staff and peers).
MRI	Magnetic Resonance Imaging
MTS	Michael Tippet School
NAS	National Autistic Society
Ofsted	Office for Standards in Education, Children's Services and Skills

PAR	Participatory Action Research
PECS	Picture Exchange Communication System
PfS	Partnership for Schools
PMLD	Profound and Multiple Learning Difficulties
RAS	Reticular Activating System
Research School	Throughout this thesis the term 'research school' referred to the school at which this research took place.
RfT	Research for Teachers
RNIB	Royal National Institute for the Blind
SAOS	School Assessment and Outreach Service
SCLD	Severe and Complex Learning Difficulties
SDM	Sherborne Developmental Movement
SEN	Special Education Needs
SLD	Severe Learning Difficulties
SRA	Social Research Association
TA	Teaching Assistant
TEACCH	Treatment and Education of Autistic and related Communication-handicapped CHildren
UN	United Nations
VCT	Vinyl Composition Tile
VI	Visual Impairment

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ADDITIONAL MATERIALS

MOV	Video of model virtual classroom	CD
PIC	Still images of model virtual classroom	CD

Notes on CD files:

This thesis has been written as a standalone text, however additional materials have been provided on CD as above. The files contained thereon are designed to be viewed on any modern computer equipment, but additional software may be needed.

An open source, cross platform video player can be downloaded from www.videolan.org.

CHAPTER 1

INTRODUCTION

1.0 Overview

This chapter has been written with the purpose of giving the reader a brief synopsis of the overall nature and structure of this thesis, and the research on which it is based. The chapter begins with a brief overview of the researcher's perspective, followed by a summary of the aims and objectives of the research and the research questions investigated. It then discusses the rationale behind the research, establishing why the particular focus of this research was selected. The chapter then moves on to provide a brief outline of the research setting, the research approach, and an overview of the research methodology. Finally an explanation of the organisation of the thesis is provided.

1.1 The Researcher's Perspective

The opportunity to undertake research exploring features of a supportive learning environment for students with profound autism was particularly appealing to the researcher who possessed a keen interest in the field of special educational needs (SEN). Prior to commencing this doctorate, the researcher both worked and studied in the field of special needs, obtaining experience in a variety of different settings, and developing a particular interest in children with profound ASDs. During this time, the researcher participated in an intensive 1:1 learning program for a child with profound autism, which provided a fascinating insight into the unique learning profile of a child with ASD, as well as first hand experience of how the environment (both social and physical) can influence the learning of children with ASDs, sparking a particular interest in this area. The present study provided the researcher with a unique opportunity to investigate this area in detail in order to develop a deeper understanding of the interaction that exists between the environment and learning for children with ASDs. As such, although the researcher was not a teacher, this research was undertaken from an educational perspective, in an attempt to identify how best to support students with profound autism to engage as effective learners.

1.2 Research Aims and Objectives

The principle aim of this research was to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners. Within this, the specific objectives of the research were to:

1. Build an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs.
2. Devise engagement scales sensitive to the learning profiles of students with ASDs.
3. Evaluate the influence of trialled modifications on student engagement through engagement scale data triangulated with other data.

Engagement was selected as a key indicator of learning with which to underpin this study. This was based on considerable research which has highlighted the importance of engagement for effective learning in students with autism (Carnahan, Musti-Rao & Bailey, 2009; Keen & Pennell, 2010; Keen, 2009; Ruble & Robson, 2007). Furthermore, research also suggests that students with disabilities in general, and particularly those with autism, spend less time actively engaged and more time passively non-engaged than their non-disabled peers (Corsello, 2005; Kishida & Kemp, 2006; Kishida & Kemp, 2006a; Kishida & Kemp, 2009b; McCormick, Noonan & Heck, 1998; McWilliam & Bailey, 1995).

1.3 The Research Setting

This research was carried out in a residential special school for children with profound and complex learning difficulties, where at present the majority of students have a diagnosis on the autistic spectrum. The opening of the school's Research Institute in January 2005 marked the culmination of a school ethos dedicated to improving the life and education of students with ASDs through evidence-based practice. Consequently, when the decision was made to build a new school, it seemed logical to approach this from an evidence-based perspective, in order to ensure that the new school would truly support the diverse learning needs of the student population for which it caters.

1.4 Rationale

Within the present study, strong emphasis was placed on identifying elements of the physical environment which influence the engagement in learning of students with autism. The rationale behind this was threefold.

Firstly, the inspiration behind this research was the planned new school build to provide the students at the research school with a new block of specifically designed classrooms sensitive to their learning needs. Consequently, the design elements of the physical environment which could be incorporated within the new school build represented a key area of interest for the research school.

Secondly, it is increasingly recognised that “children on the autistic spectrum are amongst the most vulnerable groups in our society. This largely stems from the overwhelmingly disabling effects of a sensorily handicapping built environment within which they have to perform” (Shabha, 2004, p. 1). The physical environment therefore seemed a particularly important area of focus for research exploring an effective learning environment for these students.

Thirdly, although there are a few examples of studies investigating environments for people with autism, (see Plimley, 2004; Shabha, 2004; Shabha, 2006; Whitehurst, 2006a; Whitehurst, 2006b), the majority of information in this area is largely discursive, highlighting the need to build an evidence-base of research to inform the physical design of educational environments which support students with profound autism to engage as effective learners.

Nevertheless, the literature also suggests that a study of an effective learning environment for students with autism would not be complete without consideration of the teaching approach and resources, and the people in the environment. Consequently, elements relating to these additional factors were also researched to identify the needs of this complex population of learners.

Finally, the unique naturalistic setting available for this research offered the opportunity to conduct hands-on research, interacting with teachers, students and a variety of other professionals in a natural setting. This was particularly appealing to the researcher who recognised the importance of involving students, parents and practitioners as ‘co-

constructors' (James & Prout, 1997; McDonagh, 2003) in order to fulfil the aim of this research. Hence this project provided a way of advocating student voice through research in order to provide tangible benefits for the student and staff population at the research school, with the transformational aim of improving learning for the students.

1.5 The Methodology

Thus, in order to liberate the 'silent voices' (Whitehurst, 2007) of the students involved in this research, the Mosaic approach to listening to children was utilised (Clark & Moss, 2001). Participatory action research (PAR) was employed as a meta-methodological strategy. A grounded theory study was conducted alongside the PAR spiral, and a mixed-methods design was utilised throughout. In this way it was possible to incorporate:

- Participant observations of student behaviour
- Systematic observations of student engagement
- Interviews, questionnaires and follow-up interviews with significant adults including teaching staff, carers, therapists and parents
- Specially adapted methods of listening to students' voices directly

1.6 The Structure of the Thesis

This thesis is set out in twelve chapters. It begins with this introductory chapter which provides a brief overview of the aims, objectives, methodology and rationale for this study. The literature review is then presented, divided into four chapters (chapters 2, 3, 4 and 5). These chapters discuss the literature surrounding autism, with a focus on the relationships between autism and: (a) education, (b) engagement, (c) environment.

Chapter 6 sets out the rationale for the chosen research approach, strategy and design, as well as discussing the issues of subjectivity, reflexivity and trustworthiness within qualitative research. Chapter 7 provides an overview of the selection and development of the specific data collection and analysis tools utilised in this research. Chapter 8 outlines the research setting and participants, the sampling process, how ethical considerations were met in the present study, and the methodological procedures employed.

The findings of the study are set out in chapters 9, 10 and 11. Chapters 9 and 10 discuss the first and second PAR phases of the study respectively. Chapter 11 presents the results of the direct student voice evaluation, discusses additional findings from the grounded theory study which it was not possible to investigate within the PAR spiral, and concludes with an overview of emerging theoretical models. Chapter 12 puts forward a discussion of the key findings and contributions to the body of knowledge, and provides a synthesis between these findings and issues raised in the literature review. The thesis then concludes with recommendations for the future of special education provision.

CHAPTER 2
THE CHANGING PATTERN OF CHILDHOOD DISABILITY AND THE CHANGING ROLE OF SPECIAL SCHOOLS

2.0 Overview

The following chapter will consider why there is a growing need to undertake research which fulfils the aim of this study - to employ evidence-based research to develop a learning environment which supports children with profound autism to engage as effective learners. Particular reference will be paid to the changing pattern of childhood disability, the increasing prevalence of autism, the governmental drives towards all children being educable and inclusion, the implications of this for school provision and school premises, and the changing role of special schools. The aim of this chapter is to set this research within the current educational and political context.

2.1 The Rising and Changing Pattern of Childhood Disability

At present, the Office of National Statistics confirms that, in the UK, the number of students with SEN is continuing to rise. Current figures indicate that 7% of all children have a disability or long-term condition (DfES, 2006), and that approximately 1 in 5 children now have SEN (DfES, 2007). Indeed the latest figures highlight that "952, 741 children (7.3%) in the UK in 2004-5 were reported to be disabled" (Blackburn, Spencer & Read, 2010, p. 7). Alongside the evidence of growth in the number of children with disabilities, is growing evidence to suggest that the nature of childhood disability is changing, and that disability is manifesting in different ways today to those that we have traditionally known.

According to Carpenter & Egerton (2007), there is now a perceptible difference between the needs of today's students as compared to those of 10 years ago. Carpenter (2005), suggests a number of possible causes for this rising and changing pattern of childhood disability, including:

- Rising alcohol abuse in pregnancy, and a prevalence of Foetal Alcohol Spectrum Disorder (FASD) as high as 2-5% in the United States and some Western European countries (May et al., 2009)
- Increased survival of preterm infants (Costeloe, Hennessy, Gibson, Marlow & Wilkinson, 2000)

- Rising uptake of assisted conception such as in-vitro fertilisation (IVF) and the resultant escalation in multiple births (Klemetti, Sevon, Gissler & Hemminki, 2006)
- An increase in the number of children experiencing mental health issues, including emotional disorders, attachment disorders, eating disorders etc. (Coughlan, 2007; DfEE, 2001b)
- A major rise in the incidence of autistic spectrum disorders (ASDs) (Baird et al., 2006)

2.2 The Prevalence of Autism

The major rise in the incidence of ASDs over the past twenty years is of particular relevance to this research. There is definitely an increasing prevalence of autism in the child population. In a 1966 prevalence study carried out in Middlesex, UK, it was found that autism occurred in 4 children in every 10,000 (Lotter, 1967). However, today current research indicates that as many as 1 in every 86 children are diagnosed on the autistic spectrum (Baird et al., 2006). This contrasts significantly with the 1 in 926 children diagnosed with the more familiar Down Syndrome (Morris & Alberman, 2009).

The cause of this dramatic rise in the prevalence of autism remains unclear. One possible explanation is the broadening diagnostic concept (Wing & Potter, 2002). Up until 30 years ago, autism was considered to be a categorical disorder – in other words, you either had it or you didn't (Baron-Cohen, 2008). In 1988, Lorna Wing challenged this black and white view of autism, arguing that autism lay on a continuum from mild to severe (Wing, 1988), a term which she later amended to 'autistic spectrum' (Wing, 1996). Today, the term ASDs encompasses a wide spectrum of disorders, including but not limited to, Asperger's syndrome, Kanner's autism and 'atypical' autism. Throughout this thesis, the term 'autism' is used generally to refer to 'Autistic Spectrum Disorders' (ASDs) as a whole. Where specificity is required, individual conditions encompassed by the spectrum will be referred to by name.

It remains unclear whether the actual prevalence of autism is on the rise, or whether the increasing number of children with ASDs are the result of the broadening diagnostic concept (Gillberg, 1999; Rutter, 2005), however this is a debate which will not be entered into in the current thesis. What does remain apparent is that more students in UK schools have ASDs than ever before, and 1 in 3 children in special

schools have an educational need related to autism (Barnard, Broach, Potter & Prior, 2002). Furthermore, according to Jones (2006, pp. 545-546) “Children with ASDs have particular and distinct needs from others with SEN … [they] appear to be cognitively different from neurotypical children and others with SEN, and do not perceive and experience the world in the same way”. This is a view reiterated by many eminent professionals in the field of autism research, including Happé (1999), Baron-Cohen (2000) and Frith (2003).

It is therefore clear that the educational needs of children with SEN are changing, and education services can no longer focus solely upon meeting the needs of children with traditionally recognised disabilities. Indeed “the educational needs of children with these [autistic spectrum] conditions are probably the least well understood of all the types of disability” (Wing, 2007, p. 23). Fundamentally, it is therefore essential to develop an evidence-base to facilitate schools in modifying and adapting current teaching practices and premises in order that they are able to meet the educational needs of the growing numbers of students presenting with new and increasingly complex patterns of disability.

2.3 The Changing Face of Special Needs: from Ineducable to Educable

In the not too distant past, children with autism were thought to be ineducable (Baron-Cohen & Bolton, 1993). The result of such attitudes was that they faced a future which almost certainly involved placement in long-stay mental-handicap institutions (DeMyer, Barton, DeMyer, Norton, Allen & Steele, 1973), and thus were hospitalised rather than educated (Jordan & Powell, 1995). Their subsequent failure to make educational progress from within this setting was then used as justification to support the original prognosis (Baron-Cohen & Bolton, 1993). When the validity of such assumptions began to be challenged, it slowly became clear that the evidence disproved this theory. Gradually it became recognised that almost all children can be educated if the education is correctly tailored to the individual’s needs (Baron-Cohen & Bolton, 1993).

When Stanley Segal claimed in 1967 that ‘no child is ineducable’ (Segal, 1967), this heralded the beginning of a change in thinking, culminating in the Education (Handicapped Children) Act of 1970, which gave all children a right to education. Thanks to such improvements in the educational rights of those with special needs, as well as the diagnosis and understanding of autism, many children with autism now live

at home, and all have the right to learn and attend school. However, the implications of the integration of these students who were previously institutionalised and considered ineducable upon school building design has yet to be fully realised or addressed.

2.4 The Drive Towards Inclusion

As the concept of entitlement to education became more widely recognised, there followed a growing government drive towards inclusion. The Warnock Report (Warnock, 1978) first introduced the term 'Special Educational Needs' (SEN) to encompass all students who require additional help in school in order to effectively access the curriculum. This report advocated integration for pupils with SEN, making a case for including children with special needs in mainstream schools for the first time. This is a view that has influenced education policy ever since. As a result of this, many special schools have now been closed in an effort to move towards greater integration, and only students with the most complex needs continue to be educated within special schools (Jordan & Powell, 1995).

The UK Government's[1] 1997 Green Paper, 'Excellence in All Children: Meeting Special Educational Needs' further paved the way for the inclusion of children with a wide range of SEN within mainstream educational settings (DfEE, 1997). Published in February 2004, 'Removing Barriers to Achievement – the Government's strategy for SEN' (DfES, 2004b) set out the Government's plan to ensure that all children with SEN and disabilities have the opportunity to succeed. Building on the proposals for the reform of children's services in the UK Government's 2003 Green Paper, 'Every Child Matters' (DfES, 2003) it set the agenda for improvement of educational provision for students with SEN at both a national and local level, with a sustained emphasis on inclusion.

2.5 From Inclusion to Exclusion

However, there remains debate as to whether inclusion works in practice for students with a variety of SEN including autism. According to the American Individuals with Disabilities Education Improvement Act (2004), many children with learning difficulties who are included in mainstream classrooms fail to achieve success. It is suggested that one reason for this may be that inclusion often requires children with learning

[1] Information contained within this thesis regarding UK Government policy is correct at the time of going to print, however since a new UK Government took office on 11 May 2010 this may not reflect current Government policy.

difficulties to adapt to a system which has not been designed for their use (Hitchcock, Meyer, Rose & Jackson, 2002). The consequences of this are far reaching for students with disabilities, since the result is often disengagement and failure to learn.

It is also worth noting that when a child fails to thrive within a particular educational setting, the focus of blame is often placed upon the student rather than the learning environment (Rose, Hasselbring, Stahl & Zabala, 2005). Clearly, to promote engagement and positive learning outcomes for students with SEN, educators must concentrate on addressing the problematic context in which learning is expected to occur rather than focussing on the deficits of individual children (Bambara, Dunlap & Schwartz, 2002; Carnahan, 2006; Council for Exceptional Children, 2005). Indeed, the Lamb Inquiry (2009) highlights that the 'learning environment' is one of a range of factors which may necessitate a student to require additional support with their education. Furthermore, the recent Coalition Government programme for schools (2010) stresses that "we believe the most vulnerable children deserve the very highest quality of care. We will…prevent the unnecessary closure of special schools and remove the bias towards inclusion."

In 'Special Educational Needs: A New Look', Mary Warnock identifies some of the problems associated with inclusion, highlighting how it is extremely difficult if not impossible to meet the complex needs of students with ASDs in mainstream environments (Warnock, 2005; Wing, 2007). Additionally, a significant number of mainstream teachers report that they do not consider themselves fully capable of meeting the diverse and complex needs of students with autism in the classroom (Barnard et al., 2002). In 'Autism in Schools: Crisis or Challenge?' the National Autistic Society (NAS) (2002) reports that 44% of schools catering for children with ASDs feel that these students are not receiving the specialist support that they require in order to fulfil their potential. Moreover, a massive 72% of the schools surveyed felt that their teachers received insufficient training on autism, and 32% of these schools were consequently negative about inclusion (Barnard et al., 2002).

It is therefore clear that at present the educational system frequently fails to meet the unique and complex learning needs of students with ASDs, and that this is largely a result of insufficient training, support and resources (Barnard et al., 2002; Jordan, 2008; Wing, 2007) and an unsuitable educational environment (Bambara, Dunlap &

Schwartz, 2002; Council for Exceptional Children, 2005; Lamb, 2009). As a result, exclusion from mainstream schools remains a very real concern for parents of children with ASDs, with one in five children with autism or Asperger syndrome excluded from school at some point (Barnard, Prior & Potter, 2000). Consequently, one third of all students in special schools have educational needs related to autism. It is therefore clear that this research study - aimed at identifying elements of a supportive learning environment for students with autism - is desperately needed to facilitate special schools to support students with ASDs, helping them to engage, learn and reach their full potential.

2.6 The Changing Role of Special Schools: From Institutions to Schools to Leaders in Educational Research

For students with autism and the most complex educational needs, such as those who were previously considered ineducable and those who continue to be excluded from mainstream schools, special schools represent an essential resource (Tutt, 2007). It is increasingly being recognised that "special schools are a part of the education system, not apart from it" (Carpenter, 2010b). According to Jordan (2008), special schools must have greater purpose and goals than to simply support those who are excluded from mainstream schooling. Jordan (2008, p. 13) argues that:

> *"Special schools should really be centres of excellence… pioneering new ways of working with students with ASDs and dealing with the most extreme cases. They should be centres of research as well as teaching (perhaps in collaboration with universities) and have a role in working alongside mainstream schools to bring about more effective inclusion."*

In this respect, the school in which this research took place continues to lead the way in the education of students with severe and complex learning needs and ASDs. It is nationally recognised for its achievements in educating those with the most profound ASDs, emphasising a trans-disciplinary approach to meeting the needs of each individual student. The teachers utilise a range of specialist teaching approaches for students with autism, and the school is also home to an array of professionals and therapists, including educational psychologists, speech and language therapists, occupational therapists and play therapists. Furthermore, the opening of a Research Institute in January 2005 marked the culmination of a school ethos dedicated to improving the life and education of students with ASDs through research-based practice (Carpenter, 2007a).

Moreover, educational researchers and educators alike are increasingly emphasising the importance of identifying and using educational practices which have a solid evidence-base, particularly for students with disabilities such as autism (Botts, Hershfeldt & Christensen-Sandfort, 2008; Iovannone, Dunlap, Huber & Kincaid, 2003; Roberts-Holmes, 2005; Shavelson & Towne, 2002; Simpson, 2005). According to the General Teaching Council for England (GTC) (2009, p. 3) "research is a crucial tool for teaching and professional development." The GTC has developed a web-based resource entitled 'Research for Teachers' (RfT) (GTC, n.d.) which "helps teachers access and benefit directly from research." Fundamentally, as succinctly stated by one teacher (quoted in GTC, 2009, p. 4) "RfT meant I started closer to the answer."

In the U.S., The No Child Left Behind Act of 2001 requires that educators employ scientifically based research to determine the teaching methods used in their schools. Furthermore, the American National Academy of Sciences established a committee to identify educational practices for young children with ASDs which have a proven scientific evidence-base of effectiveness (National Research Council, 2001b). Indeed Shavelson & Towne (2002, p. 12) state that "no one would think of designing a rocket to the moon or wiping out a widespread disease by relying on untested hunches; likewise, one cannot expect to improve education without research."

Consequently, when the research school identified that a new purpose-built building was required, they also recognised the importance of approaching this from an evidence-based perspective in order to ensure that the new school would truly support the diverse learning needs of the students for whom it was intended. This therefore provided a very real and functional purpose for this research study, as well as the opportunity for tangible outcomes in the form of the new school building for all the students and staff at the school.

2.7 Government Guidelines for School Premises

Although the Education (Handicapped Children) Act (1970) advocated the rights of all children to be educated, and the Warnock report (1978) promoted inclusion of students with SEN in mainstream schools, both failed to address the implications for school premises. It was not until the Architects and Building Branch (A&B) of the DES published Building Bulletin (BB) 61, 'Designing for Children with Special Educational Needs: Ordinary Schools' in 1984 (DES, 1984), that it was acknowledged that

guidance was needed on the additional space and resources required to adequately cater for students with a wide range of SEN, although students with the most severe and complex needs were still not considered (Bishop, 2001).

The introduction of the National Curriculum (NC) in 1989 together with the Code of Practice on the Identification of SEN in 1994 (DfE, 1994), although not specifically aimed at school design, did reinforce the BB61 guidelines for space, resources and staffing. However, more regular inspections by the Office for Standards in Education (Ofsted) soon revealed the unsatisfactory state of provision for SEN within existing premises, and highlighted the need for action. In response, the DfEE A&B released BB91 'Access for Disabled People to School Buildings' in 1999 (DfEE, 1999) and BB94 'Inclusive School Design' in 2001 (DfEE, 2001a) to provide further advice and guidance on how to accommodate students with SEN and disabilities in mainstream schools.

Throughout the drive towards inclusion, the Government continued to recognise that those with the most severe and complex difficulties continue to require specialist provision. Government guidelines for special school premises were first set out in A&B's BB77, 'Designing for pupils with SEN: Special Schools' (DfEE, 1992). This document provided an outline of accommodation provision requirements for students with SEN in special schools. Revised in 1997 and 2005, this document was most recently superseded by BB102 'Designing for disabled children and children with special educational needs: Guidance for mainstream and special schools' (DCSF, 2008a). BB102 recognises the specific needs of children with ASDs, stating that "they need an easily understood environment with a low level of distraction and sensory stimulus to reduce anxiety or distress. They may need a safe place to calm down" (DCSF, 2008a, p. 13).

The UK Government's Building Schools for the Future (BSF) program, launched in February 2004, aims to rebuild or renew nearly every secondary school in England. BSF is the largest and most ambitious scheme of its kind anywhere in the world. Partnerships for Schools (PfS), the organisation responsible for delivering the Governments' renewal program, claim that BSF will "transform education for some 3.3 million students aged 11-19" (PfS, n.d.). Following an extensive literature review of studies evaluating the impact of school buildings on educational performance, PfS concluded that "school design affects learning" (DCSF, 2008b, p. E1). In February

2008, The Michael Tippet School (MTS), the first special school to be completely rebuilt under the BSF program opened. MTS is a school for students with severe learning difficulties (SLD) or profound and multiple learning difficulties (PMLD), including students with ASDs and other sensory impairments. The Government is finally beginning to recognise the importance of a supportive learning environment for all students, including those with special needs.

Also worth noting, is the Autism Act (2009), the first autism-specific piece of legislation in England and Wales. In the past, governments have issued guidance on supporting people with autism, such as the Welsh Assembly Government's 'ASD Strategic Action Plan' (Welsh Assembly Government, 2008), and the Department of Health clarification note 'Better Services for People with an Autism Spectrum Disorder' (DoH, 2006). However, until now there has not been a law focusing solely on autism, and even within other pieces of legislation, specific clauses on autism are extremely rare. Although the Autism Act does not concentrate specifically on education, the focus of the 'Strategy for Adults with Autism in England' (DoH, 2010) on improving day-to-day support for individuals with ASDs and their families has the potential to radically transform their experiences.

2.8 Conclusion

It is therefore clear that this research which aims at identifying elements of a supportive learning environment for students with autism is desperately needed to facilitate schools in meeting the educational needs of this growing and complex group of students. More students in UK schools have ASDs than ever before. 1 in 3 children in special schools have an educational need related to autism, and yet there is a growing feeling amongst educators that these students "are not getting the specialist support they need" (Barnard et al., 2002, p. 7). Through BSF, BB102 and the Autism Act, the Government has acknowledged both the need for improved guidelines and provision for individuals with autism, and the importance of a supportive learning environment for all. Furthermore, researchers and educators alike are acknowledging the importance of implementing strategies which have a solid scientific evidence-base. In addition, this research fulfilled a very real and functional purpose for the school at which this study took place.

CHAPTER 3
AUTISM: AETIOLOGY, SYMPTOMATOLOGY AND LEARNING

3.0 Overview

The previous chapter summarised why the aim of this research – to develop a learning environment which supports students with profound autism to engage as effective learners – targets an area of education within which evidence-based knowledge is both desperately needed and increasingly recognised as important by researchers, educators and government alike. The following chapter will provide an overview of the aetiology and symptomatology of autism from an educational perspective, focusing on recent research developments, and their implications for addressing the question of what constitutes a supportive learning environment for students with profound autism. In particular, issues surrounding the social and sensory-perceptual impairments characteristic of autism shall be discussed in order to identify how these relate to the aim of this study.

3.1 Autism: A Brief History

A century ago, autism was unheard of. The name simply did not exist. However, although autism remained unrecognised until fairly recently, there is evidence that it is a condition which has affected people throughout history, in all countries and cultures (Frith, 2003; Wing, 1996). The term 'autism' was first used by the Swiss psychiatrist Eugen Bleuler in 1911 to describe the withdrawal from society which he identified as one of the major symptoms of schizophrenia (Frith, 2003). The first account of autism as we understand it today, appeared in the professional literature in the work of Leo Kanner, a child psychiatrist at Johns Hopkins University.

In 1943, Kanner published *'Autistic Disturbances of Affective Contact'* in which he identified 11 children who behaved differently to the others diagnosed with childhood schizophrenia. They showed what he termed 'extreme autistic aloneness' – a complete lack of interest in the people around them (Kanner, 1943). To describe these children he used the term 'autism' since its roots come from the Greek word 'autos' meaning 'self'. In 1944, Hans Asperger, an Austrian paediatrician, published ***'****Autistic Psychopathy in Childhood****'*** in which he described four boys who, despite adequate verbal and cognitive skills, displayed deficits in social interaction and milder autistic behaviours. This article, published in Asperger's native German, remained largely

unrecognised until it was translated by Lorna Wing in 1981, and it was not until 1991 that it became more widely available within Uta Frith's book 'Autism and Asperger Syndrome' (Asperger, 1944; Wing, 1981).

Although entirely unaware of each other's work, both Kanner and Asperger simultaneously used the word "autistic" to characterise the disturbances that they observed. They also both independently recognised that the difficulties their patients exhibited in entering affective relationships with others were present from early childhood and followed a consistent and chronic course, which contrasted to Bleuler's use of the term "autism" in schizophrenia to describe symptoms which typically manifested as a progressive loss of contact with the external world.

3.2 Autism: Symptomatology, Aetiology and Learning

Today, Autistic Spectrum Disorders (ASDs) are recognised as a range of neurologically based developmental disorders, or 'neurodevelopmental' disorders. To support this neurodevelopmental hypothesis of autism, an abundance of neurological research, including clinical assessment, neuroimaging, neurophysiological, neuropathological and neuroanatomical studies have been undertaken to examine the structure, morphology and functioning of the brains of individuals with ASDs (Pardo & Eberhart, 2007).

To date, an array of different neurodevelopmental theories have been developed, proposing that aberrations in brain growth, neuronal patterning and cortical connectivity are the cause of ASDs (Pardo & Eberhart, 2007). However, the aetiology of autism remains elusive, with the evidence so far failing to support a single explanation for the diverse range of social (e.g. pragmatic language, imitation, joint attention and empathy) and sensory-perceptual problems (e.g. auditory processing delay) symptomatic of the disorder (Fisher, Van Dyke, Sears, Matzen, Lin-Dyken & McBrien, 1999; Oberman & Ramachandran, 2008; Rutter, 2005).

Nevertheless, recent years have seen the field of brain research advance tremendously, providing fascinating insights into the neurological basis of autism. However, results from these new domains have as yet not been fully integrated with educational practice. Despite educators and researchers increasingly being aware of the importance of evidence-based practice (as discussed in section 2.6), there remains

a “now-famous research to practice gap in education … [which] is of critical importance because research should be the foundation from which teaching and learning practices are developed and improved” (Burns & Ysseldyke, 2009, p. 3). Furthermore, as succinctly stated by Carpenter (2010a), “new aetiologies bring new vocabularies and necessitate new responsive pedagogies.” The relationship between the aetiology, symptomatology and learning of students with autism shall now be discussed in an attempt to reveal how current empirical research can contribute towards a better understanding of the unique and complex learning styles and needs of students with ASDs, and thus enhance educational provision for these students.

3.2.1 Social Impairments: Symptomatology and Learning

In the pioneering works of Kanner (1943) and Asperger (1944), they both present detailed descriptions of children who displayed a unique array of characteristics which distinguished them from the other children at their clinics. Kanner identified the following characteristics:

- An extreme aloneness and lack of social responsiveness
- An obsessive desire for the preservation of sameness
- Islets of ability, such as an excellent rote memory
- Mutism, or delayed language development including echolalia
- An oversensitivity to sensory stimuli
- A tendency toward repetitive activities and play (Kanner, 1943)

Asperger noted similar characteristics, but in contrast to Kanner’s observations, some of the children Asperger assessed showed relatively normal language development and abilities (Asperger, 1944).

In 1979, Wing and Gould conducted their own observations of children with autism, and devised three categories of symptoms which they identified to be present in all children with autism. These three categories, which they labelled the ‘triad of impairments’ are:

- Impairments of social interaction
- Impairments of social language and communication
- Impairments of flexibility of thought and imagination

The triad of impairments in social development identified by Wing & Gould (1979) have since become the backbone for the diagnostic criteria for ASDs, and to receive a diagnosis of autism, an individual must show impairments in each of these three areas. Clearly it is therefore essential to understand the ways in which the triad of impairments affect learning if one is to devise an optimal educational environment for students with ASDs.

Fundamentally, these social impairments affect the way in which people with autism understand and react to the world around them (Wing & Gould, 1979). For example, they experience difficulties in understanding receptive language: spoken language, gesture, facial expression and other social nuances (Baron-Cohen, Ring, Bullmore, Wheelwright, Ashwin & Williams, 2000; Wing, 2007) as well as problems with expressive verbal language skills (Charlop & Haymes, 1994; Wing, 2007) with as many as 50% having no acquisition of spoken language (Prizant, 1996). Consequently, they have problems understanding and interpreting the behaviour of others and the world around them, and difficulty communicating their needs, resulting in a tendency towards challenging behaviour as a means of communication (Clements & Zarkowska, 2000), and a preference for highly structured environments and routines (Baron-Cohen & Bolton, 1993; Baron-Cohen, 2008; Frith, 2008; Mesibov & Howley, 2003).

Social orienting - the ability to direct attention to another person in order to achieve "the goal of coordinating social interaction" (Mosconi, Reznick, Mesibov & Piven, 2009a, p. 242) – is thought to be fundamental for later social and language function (Dawson et al. 2004). Studies have consistently found that individuals with autism show deficits in social orienting and pivotal developmental behaviours related to social orienting, including social attention, persistence, interest, initiation, cooperation, joint attention and affect (Mosconi et al., 2009a; Koegel & Koegel, 2006; Dawson, Meltzoff, Osterling, Rinaldi & Brown, 1998). These studies suggest that this may be a major precursor to the development of the triad of impairments integral to autism (Baranek, 1999; Dawson et al., 2004; Klin, Sparrow, de Bildt, Cicchetti, Cohen & Volkmar, 1999; Osterling, Dawson & Munson, 2002; Werner, Dawson, Osterling & Dinno, 2000).

In addition, social orienting ability and subsequent participation in social interaction is increasingly being recognized as essential for the overall development and learning of all children, including those with autism (Dawson et al., 2004; Greenspan, Wieder &

Simons, 1998; MacDonald, 2004; Mosconi et al., 2009a). For example, studies have revealed that the joint attention skill is central to the development of language, cognitive and social abilities in both typically developing children and those with autism (Adamson, Bakeman, Deckner & Romski, 2009; Bono, Daley & Sigman, 2004; Charman, 2003; Dawson et al., 2004; Tomasello, 1995). Furthermore, Beadle-Brown, Murphy & Wing, (2005) conducted an extensive 25-year follow-up study of individuals with significant social or mental difficulties and found that social impairment was inversely related to outcome—those who were socially impaired showed the poorest outcome in terms of independent functioning and quality of life.

This research seems to suggest that the ability to engage socially is directly correlated to improved learning and development. However, as succinctly stated by Konaka (2007c, p. 38) "due to their sensory sensitivities and social difficulties, many children with ASD have been unable to engage fully in the experiences necessary to enable them to develop even the very basics of social interaction and communication." Thus, children with autism miss out on the types of situations in which typically developing children gain a social education. "The lack of attention to social stimuli limits the child's opportunity to engage in critical early social experiences which provide the foundation for social development" (Dawson et al., 1998, p. 479), preventing the acquisition of the pivotal developmental behaviours fundamental to successful social interaction, engagement and learning (Aitkin & Trevarthen, 1997; Werner et al., 2000).

The implications of this for the aim of this study - to develop a learning environment which supports students with profound autism to engage as effective learners – are clear. An appropriate learning environment for students with profound autism must "endeavor to increase the salience of the social world for children with autism" (SRP, n.d., p. 6) in order to promote social interaction and social engagement. This is a view supported by Nind, (2000, p. 45) who states that:

> *"…all learners (and especially those with complex learning disabilities) need sound foundations for learning in the form of … the development of fundamental communication and social abilities (whatever their age)."*

Furthermore, according to Carpenter (2007b, p. 160) "anything that can strengthen communication interactions, and the connection of the child with ASD to another human being is to be encouraged." This therefore highlights the importance of considering how the learning environment can be adapted to help students with autism

gain a social education. Consequently, this issue will be discussed further in chapters 4 and 5, and explored through the course of this research.

3.2.2 Social Impairments: aetiology and learning

Despite all the evidence to support social impairments in children with autism, the neurological basis for this remains unclear. Recent research indicates that an overenlarged amygdala may be a core cause of the social deficits characteristic of autism (Baron-Cohen et al., 2000; Mosconi, Cody-Hazlett, Poe, Gerig, Gimpel-Smith & Piven, 2009b). The amygdala is a brain area associated with numerous functions, including the processing of faces and emotion, behaviours indicative of social orienting. It has also been shown to be intrinsically important in the development of the more complex cognitive functions such as social attention, social behaviour, and language, all of which show impairments in individuals with ASDs (Belmonte, Allen, Beckel-Mitchener, Boulanger, Carper & Webb, 2004a; Dawson et al., 2002).

Recent studies have consistently documented that young children with ASDs show abnormal brain growth (Aylward, Minshew, Field, Sparks & Singh, 2002; Courchesne et al., 2001; Courchesne, 2004; Courchesne, Redcay & Kennedy, 2004; Sparks et al., 2002) characterised by an overgrowth between 2-4 years (Courchesne & Pierce, 2005; Schumann et al., 2004; Wallace & Treffert, 2004). By 3-4 years of age, brain size in individuals with ASDs exceeds the normal average by approximately 10% (Courchesne et al., 2001; Redcay & Courchesne, 2005; Sparks et al., 2002) Furthermore, recent studies have revealed that as well as showing an overenlargement, the amygdala in individuals with autism also houses fewer neurons than the amygdala in typically developing individuals (Schumann & Amaral, 2006).

Studies have also revealed that the amygdala is activated by the mirror neuron system (Carr, Iacoboni, Dubeau, Mazziotta & Lenzi, 2003) and is closely connected with imitation-related action processing systems, with findings suggesting that “the amygdala is a key regulator of social cognitive function, and amygdaloid involvement in action perception-connectivity forms the foundations of social cognitive neural systems” (Williams, Waiter, Gilchrist, Perrett, Murray & Whiten, 2006, p. 10). This implicates the amygdala in another neurological explanation for the social impairments presented by individuals with autism, the recently proposed ‘broken mirror’ theory of autism

(Oberman, Hubbard, McCleery, Altschuler, Ramachandran & Pineda, 2005; Ramachandran & Oberman, 2006; Williams, Whiten, Suddendorf & Perrett, 2001).

Oberman et al. (2005) have illustrated using EEGs that individuals with ASDs have a deficiency of mirror neurons - nerve cells which permit people to see a clear reflection of the actions of others and respond to them accordingly. Furthermore, the mirror neurons they do possess respond only to their own actions, and not to the actions of others, as is the case in individuals with neurologically typical development (Ramachandran & Oberman, 2006). Studies suggest that mirror neurons play a critical role in higher-order cognitive processes such as imitation (Iacoboni & Dapretto, 2006; Ramachandran, 2000; Rizzolatti, Fadiga, Fogassi & Gallese, 2002; Rizzolatti, Fogassi & Gallese, 2001; Williams et al., 2006), language (Ramachandran, 2000; Rizzolatti & Arbib, 1998), and empathy (Carr et al., 2003), all of which are characteristically impaired in individuals with ASDs (Bacon, Fein, Morris, Waterhouse & Allen, 1998; Baron-Cohen, 2001; Frith, 2003; Kjelgaard & Tager-Flusberg, 2001; Rogers, Hepburn, Stackhouse & Wehner, 2003).

It is thus hypothesised that mirror neurons could be the basis for people's ability to recognise emotions and communication, and to imitate and match these, and that perhaps in some fundamental way, mirror neurons form the neurological foundation for communication and social functioning. Consequently, if individuals with autism have fewer mirror neurons, and the ones they do have do not respond to the communicative actions of others as they should, this could explain the social impairments characteristic of autism (Le Bel, Pineda & Sharma, 2009; Williams et al., 2001; Oberman, Pineda & Ramachandran, 2007).

Since mirror neurons are essential in order to see a clear reflection of the actions of others, they play a crucial role in the ability to imitate the actions of others (Iacoboni, Woods, Brass, Bekkering, Mazziotta & Rizzolatti, 1999; Koski, Iacoboni, Dubeau, Woods & Mazziotta, 2003; Tanaka & Inui, 2002). It is hypothesised that the deficient and dysfunctional mirror neurons observed in individuals with ASDs cause a deficit in mapping neural codings for actions between sensory and motor modalities, or ‘perceptual-motor translation’ (Catmur, 2008), which subsequently impedes the ability to imitate.

With regards to learning, if the mirror neurons individuals with autism possess respond only to their own actions, this may explain why children with autism frequently show an impairment in the capacity to imitate (Escalona, Field, Nadel & Lundy, 2002; Rogers et al., 2003; Rogers, 1999; Smith & Bryson, 1994). Furthermore, since imitation is "a foundation step to learning" (Carpenter, 2007b, p. 159; Feinstein & Duckworth, 2006) and is a skill crucial for successful observational learning (Van Gog, Paas, Marcus, Ayres & Sweller, 2009), this may explain why "children with ASD … are not incidental learners" (Carpenter, 2007b, p. 160). In addition, this may also explain why children with ASDs often benefit from opportunities for kinaesthetic learning, or 'learning-through-doing' (Egerton, Cook & Stambolis, 2009a; Hill, 2006; Jordan & Powell, 1995; Marsden & Egerton, 2007; Ornitz, 1974). Carpenter (2007b, p. 158) claims that "kinaesthetic learning is powerful and tangible for the child, and I believe strongly that we do not value it enough."

Nevertheless, research suggests that "the brain is a plastic organ, and training can modify its structure and its function … an approach consisting in a training of imitative skill may be a valid way to develop not only imitation per se, but also socio-cognitive aspects in autism" (Hadjikhani, 2007, pp. 159-160). This view is reiterated by Carpenter (2007b, p. 160) who claims that "stimulation of mirror neurons through motor and movement activity can be helpful to the development of … the child with ASD". Furthermore, studies have also found that when children with autism have the opportunity to benefit from imitation sessions, they show a correlated increase in appropriate social behaviours (Field, Field, Sanders & Nadel, 2001; Wallen & Bulkeley, 2006). For the present study, this evidence suggests that in order to fulfil the aim of this study – to develop a learning environment which supports students with profound autism to engage as effective learners - it will likely be important to consider teaching approaches and resources which offer opportunities for visual-kinaesthetic learning.

3.2.3 Sensory-Perceptual Impairments: Symptomatology and Learning

Although the triad of impairments has since become the backbone for the diagnostic criteria for ASDs, in the 1960s and 70s sensory-perceptual problems were also presented as possible core features of autism (Rimland, 1964), and a theory of sensory dysfunction in autism was generated (Delacato, 1974). However, until recently this aspect of the symptomatology of autism was largely ignored. Nevertheless, it is now increasingly being recognised that "sensory processing difficulties [affect] … as many

as 95% of children with autism" (Baker, Lane, Angley & Young, 2008) and some studies have found that 100% of individuals with autism have difficulties in certain areas such as auditory processing (Greenspan & Wieder, 1997).

When discussing sensory dysfunction in autism, "a distinction must be made between sensory impairments and sensory-perceptual impairments. The former refers to losing sight or hearing … the latter is much more complex as it encompasses almost entirely all the senses … their perception may be delayed or distorted; their sensory inputs are mixed" (Shabha, 2006, p. 32). These impairments are characterised by sensory sensitivities and difficulties in processing and regulating sensory input. Two common categories of sensory dysfunction relate to hyper- and hyposensitivity (Baranek, 2002; Bogdashina, 2003; O'Neill & Jones, 1997). Hypersensitivity relates to an exaggerated response to sensory stimuli, with the result that the person will be sensation-avoiding, such as averting eyes away from lights, and covering ears in noisy situations. Hyposensitivity relates to a lack of response to sensory stimuli, resulting in the person being sensory seeking, such as diminished response to pain and a tendency to mouth everything (Baranek, David, Poe, Stone & Watson, 2006; Dunn, Saiter & Rinner, 2002).

Hyper- and hypo-sensitivity to sensory stimuli in individuals with autism has been frequently reported in recent years (Hirstein, Iversen & Ramachandran, 2001; McAlonan et al., 2002; Miller, Reisman, McIntosh & Simon, 2001). Furthermore, the evidence also indicates that hyper- and hypo-sensitivity may co-exist in autism (Greenspan & Wieder, 1997; Hirstein et al., 2001), and that whilst sensory processing problems are exhibited by the majority of individuals with ASDs, the way in which this manifests varies for each individual (Greenspan & Wieder, 1997; Kranowitz, 2005), further increasing the complexity of the situation.

Furthermore, having sensory dysfunction in any of these senses can have a profound effect on an individual's ability to function and engage. To provide an overview of the difficulties which may arise from this sensory dysfunction, Table 3.1 presents the location and function of the seven senses, along with examples of behaviours resulting from hyper/hyposensitivity in each sense.

SENSE	VISUAL (sight)	AUDITORY (hearing)	TACTILE (touch)	GUSTATORY (taste)	OLFACTORY (smell)	VESTIBULAR (balance)	PROPRIOCEPTIVE (Body awareness)
LOCATION	Eyes	Inner Ear – stimulated by air / sound waves	Skin – density of cell distribution varies throughout the body. Areas of greatest density include mouth and hands.	Chemical receptors in the tongue – closely entwined with the olfactory (smell) system.	Chemical receptors in the nasal structure – closely associated with the gustatory system	Inner ear – stimulated by head movements and input from other senses, especially visual.	Muscles and joints – activated by muscle contractions and movement.
FUNCTION	Provides information about objects and persons. Helps define boundaries as we move through time and space.	Provides information about sounds in the environment (loud, soft, high, low, near, far)	Provides information about the environment and object qualities (touch, pressure, texture, hard, soft, sharp, dull, heat, cold, pain)	Provides information about different types of taste (sweet, sour, bitter, salty, spicy).	Provides information about different types of smell (musty, acrid, putrid, flowery, pungent).	Provides information about where our body is in space, and whether or not we or our surroundings are moving. Tells about speed and direction of movement.	Provides information about where a certain body part is and how it is moving.
HYPER	Acute vision e.g. an aversion to bright / fluorescent lights, easily distracted	Acute hearing – noise sensitive – avoids crowds and noisy environments	Touch may be painful, they may pull away	Acute taste – may avoid strong tasting foods	Acute smell – may avoid eating foods with strong smells	Dislikes movement, difficulty walking on uneven surfaces, trip easily, poor gross motor skills	Odd body posturing, poor fine motor skills
HYPO	Staring at lights, reflections, bright colours, touching all objects in a room	Like loud noises, create noises e.g. banging	Do not feel pain / temperature. Like deep pressure, tight clothes, weighted blankets.	Mouth everything	Smell everything	Seek movement such as spinning, swinging, rocking.	Difficulty knowing where their bodies are - tendency to bump into things, trip over, appear floppy.

Table 3.1: Locations, Functions and Dysfunctions of the Seven Senses.
Adapted from Myles, Cook, Chiles, Rinner, Robbins, & Miller (2001, p. 5) and Bogdashina (2002).

Clearly these sensory-perceptual impairments hold the potential to have a significant impact on the development and learning of students with ASDs, and thus undoubtedly require consideration in order to fulfil the aim of this study; to develop a learning environment which supports children with profound autism to engage as effective learners. However, a clear understanding of the full impact of these issues requires a discussion of the aetiology of the sensory-perceptual impairments in autism, and thus shall be addressed at the end of the following section.

3.2.4 Sensory-Perceptual Impairments: Aetiology & Learning

The timing of the rapid brain overgrowth in young children with autism described in section 3.2.2 may be particularly significant in explaining the subsequent sensory-perceptual impairments in autism, since it coincides with a time of important synaptic development, when neuronal connections are developed, refined, and stabilised in the brain of a typically developing child (Redcay & Courchesne, 2005). This process, labelled "*experience-expectant* information storage refers to incorporation of environmental information that is ubiquitous in the environment and common to all species members, such as the basic elements of pattern perception" (Greenough, Black & Wallace, 1987, p. 539). For children with autism, the process of abnormally rapid brain overgrowth followed by abnormally slow brain growth may interfere with the normal developmental course of 'experience-expectant information storage'.

Courchesne and Pierce (2005) suggest that the abnormal pattern of rapid brain growth which occurs in young children with autism may primarily interfere with the development of large, integrative neurons that normally require the most protracted period for maturation. These integrative neurons typically exist within the frontal and temporal cortex, and are critical to long-distance inter-regional neuronal communication (Huttenlocher & Dabholkar, 1997). The resultant reduction in long-distance inter-regional connectivity would be particularly detrimental to more complex higher-order sensory processing and cognitive functioning, since these rely on the long-distance integration of information from many different regions of the brain (Redcay & Courchesne, 2005).

When the developing brain is unable to take advantage of the brief opportunity for 'experience-expectant storage', it consequently becomes entirely reliant on experience-dependent mechanisms of learning. "*Experience- dependent* information storage refers

to incorporation of environmental information that is idiosyncratic, or unique to the individual, such as learning about one's specific physical environment or vocabulary which require specific environmental inputs" (Greenough et al., 1987, p. 539). This could explain why individuals with autism have difficulty generalising learnt skills. Furthermore, 'experience-dependent storage' supports the development and maturation of local neurons responsible for intra-regional communication (Greenough, Cohen & Juraska, 1999). The increase in intra-regional neurons, combined with the reduction in inter-regional neurons would force the autistic brain to utilise local featural processing at the expense of global integrative information processing (Redcay & Courchesne, 2005), providing an explanation for the weak central coherence theory of autism (Frith & Happé, 1994; Happé, 1999).

Evidence in support of this theory of reduced inter-regional neurons was provided by a recent fMRI study of sentence comprehension which showed reduced inter-regional connectivity in individuals with autism as compared to controls (Just, Cherkassky, Keller & Minshew, 2004). Functional neuroimaging studies provide further support for this hypothesis since they show that the brains of those with autism tend to exhibit greater activation in areas dependent on primary sensory processing and reduced activity in areas typically required for higher-order processing (Baron-Cohen et al., 1999; Castelli, Frith, Happe & Frith, 2002; Critchley et al., 2000; Pierce, Muller, Ambrose, Allen & Courchesne, 2001; Ring et al., 1999; Schultz, Romanski & Tsatsanis, 2000).

An over-abundance of local connectivity would also cause sensory inputs to evoke abnormally large activations for both attended and unattended stimuli alike. This is supported by studies revealing that individuals with autism show abnormally heightened responses to novel stimuli, even when these stimuli are peripheral to the task (Ferri, Elia, Agarwal, Lanuzza, Musumeci & Penisi, 2003; Kemner, Verbaten, Cuperus, Camfferman & van Engeland, 1995; Sokhadze, Baruth, Tasman, Sears, Mathai, El-Baz & Casanova, 2009). Following a meta-analysis of studies examining responses to auditory stimuli, Bomba & Pang (2004, p. 166) concluded that such studies "reflect ineffective regulation of … sensory input in autism … [and] support the hypothesis that autism may affect … [sensory] processing." This supports behavioural observations that individuals with autism show hyper-arousal to sensory input and are

often greatly distracted by irrelevant or peripheral stimuli (Malvy, Barthelemy, Damie, Lenoir, Bodier & Roux, 2004).

These studies indicate that sensory-perception in autism seems "to occur in an all-or-none manner, with little specificity for the location of the stimulus, for the behavioural relevance of the stimulus, or even for the sensory modality in which the stimulus appears" (Belmonte, 2000, p. 272). This provides a possible explanation for the inability to discriminate between competing stimuli frequently observed in individuals with autism (Belmonte & Yurgelun-Todd, 2003; Burack, Enns, Stauder, Mottron & Randolph, 1997). Studies using EEGs conducted during visual and auditory attention tasks support this theory, identifying both increased and indiscriminate activity within sensory brain regions, coupled with a decrease in integrative brain activity (Belmonte, 2000; Townsend & Courchesne, 1994).

These behavioural, physiological and neurological studies indicate that individuals with autism have a deficit in global perceptual filtering, the process which enables an individual to select the few relevant stimuli from the abundance of sensory stimuli they are presented with in any given situation in order to exert control over the scope of their attention to stimuli in the environment (Burack et al., 1997; Wainwright & Bryson, 1996). The result of this filtering deficit is that the autistic brain gives both task-relevant and task-irrelevant stimuli equal priority, resulting in a flood of sensory information being perceived (Belmonte, 2000; Belmonte, et al., 2004b). Thus, whilst the neurologically typical brain can efficiently identify and discard irrelevant stimuli in order to focus valuable higher-order attention on that which is task-relevant, in the autistic brain "all stimuli receive much the same degree of sensory evaluation, and the irrelevant stimuli must then be actively discarded in a manner that creates a processing bottleneck" (Belmonte et al., 2004b, p. 647).

However, in addition to this global sensory processing deficit, studies have also shown that individuals with autism exhibit significantly higher or significantly lower internal arousal in autonomic activity than their non-autistic counterparts (Hirstein et al., 2001; Toichi & Kamio, 2003). In other words, they also experience sensory dysfunction of an 8th sense, "interoception: the sense of the physiological condition of the body" (Craig, 2003, p. 500). It has been suggested that this may arise from a deficit in the functioning of the amygdala, since the amygdala has an excitatory role in producing autonomic

responses (Baron-Cohen et al., 2000). As a result, the autonomic nervous systems of individuals with autism have difficulty self-regulating, and individuals with autism frequently exhibit an internal environment of hyper/hypo-arousal as compared to non-autistic individuals (Hirstein et al., 2001). This deficit in sensory self-regulation serves to exacerbate the sensory processing difficulties discussed above. In addition, "the interoceptive sense … regulates functions such as hunger, thirst, digestion, body temperature, sleep, mood, heart rate, and state of arousal … many children [with autism] lack efficient interoception and, for example, may not sense when they are hungry or need to have a bowel movement" (Kranowitz, 2005, p. 54). This causes difficulties with temperature regulation, sleep regulation, satiety regulation and toileting.

In addition, "there is growing recognition that sensory problems may be the underlying reasons for stereotypy and self-stimulatory behaviour" (Shabha, 2006, p. 33), and that individuals with autism employ behaviours such as rocking and hand flapping as coping strategies to either assist sensory regulation or defend themselves against sensory overload. Jordan & Powell (1995) state that these actions, "however obsessive, may be serving a function." This view is also supported by Bogdashina (2003, p. 57) who outlines that,

> *"… autistic individuals often describe their stims as defensive mechanisms … to suppress the pain or calm themselves down … therefore, these self-stimulatory behaviours … 'bizarre behaviours' (such as rocking, spinning, flapping their hands…) can be viewed as involuntary strategies the child has acquired to cope with 'unwelcome stimulation'."*

This is further corroborated by autobiographical reports from many individuals with autism (Bluestone, 2002; Gillingham, 1995; Jones, Quigney & Huws, 2003; Williams, 1994).

These studies "paint a picture of the world occupied by individuals with autism as chaotic, overwhelming and filled with 'noise'" (SRP, n.d., p. 2). Blackburn (2007), an autistic individual, describes that, "to me the outside world is a totally baffling incomprehensible mayhem which terrifies me. It is a meaningless mass of sights and sounds, noises and movements coming from nowhere, going nowhere." It is thus perhaps unsurprising that "many a time autistic individuals have been 'pushed' beyond their limits of sensory endurance. Often this is due to those relating to them not having understood how 'painful' it is to be overloaded by too much sound; visual stimulation"

(Lawson, 2003, p. 11). Clearly therefore, these sensory perceptual difficulties will have important implications for the education of students with ASDs.

The area of sensory processing which has received the most attention to date, is that of auditory processing, perhaps due to the hypothesised link between this and language acquisition. As a result of research in this area, in the last 30 years it has become increasingly well recognised that "students with ASD have strengths in processing visual information in comparison to processing language or auditory information" (Hume, 2006, p. 4) and consequently have a strong preference for visual instruction over verbal (Mesibov & Howley, 2003; Mesibov, Shea & Schopler, 2004; Quill, 1995; Wheeler & Carter, 1998; Worth, 2005). Indeed Hodgdon (1998) describes individuals with autism as being 90% visual learners and 10% auditory learners.

This preference for visual instruction is supported by neurological studies using MRI scans which have shown that individuals with autism interpret letters of the alphabet as geometric shapes, using the right hemisphere of the brain, rather than using the left hemisphere to interpret them linguistically by the names of the letters, as is the case with most people with neurologically typical development (Koshino, Carpenter, Minshew, Cherkassky, Keller & Just, 2005). This knowledge has since formed the basis for autism-specific teaching approaches which rely heavily on visual instruction, such as the Treatment and Education of Autistic and Communication-handicapped Children (TEACCH) approach (Mesibov & Howley, 2003; Mesibov et al., 2004; Mesibov, 1997; Schopler, 1994; Schopler, Mesibov & Hearsey, 1995). There is now an abundance of literature indicating that the use of visual supports in the education of students with ASDs correlates with enhanced engagement, achievement and independence, and lower incidences of challenging behaviour (Bryan & Gast, 2000; Hall, McClannahan & Krantz, 1995; Horner, Carr, Strain, Todd & Reed, 2002; MacDuff, Krantz & McClannahan, 1993; Pierce & Schreibman, 1994).

This literature therefore suggests that to accommodate for the sensory processing and regulatory deficits experienced by individuals with autism, the physical environment and teaching approach and resources hold the potential to be key and primary factors requiring consideration when designing an educational environment to support students with autism to engage in learning. However, since the benefits of visual teaching strategies for students with autism is an area which has already received

extensive research, and the TEACCH approach was already effectively implemented within the research school (Chatwin & Harley, 2007), this will not be an area investigated in any detail through the present study.

Nevertheless, in order to fulfil the aim of this study, it is clear that consideration must be given to:

1. elements of the physical environment which can be adapted to accommodate the sensory processing difficulties experienced by individuals with autism, and
2. the provision of suitable environments and resources to support the sensory regulatory difficulties experienced by individuals with autism

Consequently, what may constitute a supportive educational environment for students with ASDs in order to accommodate these sensory processing and regulatory difficulties is an issue which will be discussed further in chapter 5, and explored in detail through the course of this research.

3.3 Conclusion

It is clear from the evidence discussed so far that due to the social and sensory-perceptual impairments characteristic of autism, students with ASDs present a unique array of learning patterns, needs, and teaching challenges (Quill, 1995; Quill, 1997) which have a profound impact upon their ability to engage and learn (Mesibov et al., 2004; Worth, 2005). The aim of this study – to develop a learning environment which supports students with profound autism to engage as effective learners – thus addresses an area in which there is a clear need for research. Furthermore, from a thorough consideration of the most recent research regarding the symptomatology and aetiology of autism, it is apparent that in order to fulfil this aim, it will be important to consider:

- the physical learning environment (to accommodate the sensory processing and regulatory problems experienced by individuals with autism).
- the teaching approach and resources (to target their visual-kinaesthetic learning styles)

- the social environment (to facilitate students' social engagement)

Consequently, these issues shall be explored in greater detail in chapters 4 and 5, and throughout the course of this research.

CHAPTER 4
AUTISM AND ENGAGEMENT IN LEARNING

4.0 Overview

According to Keen (2009, p. 136), "the study of engagement has the potential to assist educators and therapists to maximise learning outcomes." Clearly therefore a thorough understanding of the concept of engagement is crucial in order to fulfil the aim of this research: to develop a learning environment which supports students with profound autism to engage as effective learners. The following chapter will now review the literature on student engagement from an educational perspective in order to ascertain (i) what engagement is, (ii) why engagement is important for learning and (iii) the relationship between the environment and engagement.

4.1 Engagement

For over three decades, researchers in the field of education have been attempting to identify important classroom factors which underlie achievement (Seonjin, Brownell, Bishop & Dingle, 2008), in order to determine why some schools produce better educational outcomes than others (Zyngier, 2008). One characteristic of classroom practice which has consistently emerged as 'important' has been students' engagement in learning (Berliner, 1984; Brophy, 1979; Gettinger, 1985; Greenwood, Delquadri & Hall, 1984; Rosenshine & Berliner, 1978).

4.1.1 What is Engagement?

At present, "there is no agreed conceptualisation or definition of engagement" (Keen, 2009, p. 137). According to Newmann (1986, p. 242), "engagement is difficult to define operationally, but we know it when we see it, and we know it when it is missing." Consequently, over the last three decades, the term 'engagement' has received many interpretations, and numerous definitions of engagement now exist in the literature.

The National Research Council (2001a, p. 160) defines engagement rather vaguely as "sustained attention to an activity or person". More recently, broader definitions have expanded the concept of engagement from a state (what they are doing) to a trait (how they are doing it) (Ruble & Robson, 2007). For example, engagement is defined by many as 'developmentally appropriate interactions with the environment, including materials and people' (Bailey & Wolery, 1992; McWilliam & Bailey, 1995; Ridley,

McWilliam & Oates, 2000). In this way, the concept of engagement progresses from a dichotomous variable considering only the *quantity* of time spent engaged, to a qualitative construct encompassing multiple dimensions of the *quality* of engagement, including the *focus* of the engagement i.e. materials or people and the *level* of engagement being elicited (Ruble & Robson, 2007).

De Kruif and McWilliam (1999) argue that by limiting engagement to only a measure of how much time a child spends in an activity, one is likely to miss important behaviours critical for learning. Furthermore, since children with disabilities have been shown to be engaged both for less time and at lower levels than children without disabilities (Bailey, McWilliam, Ware & Burchinal, 1993; McCormick et al., 1998; McWilliam & Bailey, 1995), observation of the level of engagement occurring would seem particularly pertinent for this population of students.

Moreover, since students with autism have a propensity to avoid engaging socially with people (see section 3.2.1), which holds the potential to negatively impact all further development and learning (Wimpory et al., 2007), the focus of engagement would seem particularly important for this population of students. Indeed Keen (2009, p. 136), stresses that, "engagement … is a multidimensional construct influenced by many variables that interact in complex ways to influence intervention outcomes for children with autism."

The literature discussed would therefore seem to suggest that for students with disabilities such as autism, it is important to consider engagement as a multidimensional construct. Consequently, the commonly held definition of engagement as 'developmentally appropriate interactions with the environment, including materials and people' (Bailey & Wolery, 1992; McWilliam & Bailey, 1995; Ridley et al., 2000) was adopted for use within the present study, in order to assist in the fulfilment of the research aim – to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners.

4.1.2 Why is Engagement Important?

According to McWilliam, Trivette & Dunst (1985, p. 60), "engagement sets the occasion for optimal learning to occur." Furthermore, for students with disabilities, research has suggested that engaged behaviour is the single best predictor of successful learning

(Bulgren & Carta, 1992; Greenwood, Carta, Kamps, & Arreaga-Mayer, 1990; Iovannone et al., 2003; Katz & Mirenda, 2002; Sindelar, Smith, Harriman, Hale & Wilson, 1986). Consequently, many educators and researchers in the field of disability have in recent years come to focus upon engagement as the foundation for effective learning in these students (Guralnick & Albertini, 2006; Keen, 2009; Mesibov & Howley, 2003; Mesibov et al., 2004; Ruble & Robson, 2007). This perspective is also supported by a UK government-funded research project which is currently exploring the development of meaningful pathways to personalised learning for students with complex learning difficulties and disabilities (CLDD). "The aim of the project is to create a supportive framework for educators of children with complex needs … focused on student engagement" (CLDD Website, 2010).

Unfortunately, children with disabilities have consistently been shown to engage for less time and at lower levels than their non-disabled peers (Bailey et al., 1993; McCormick et al., 1998; McWilliam & Bailey, 1995). For children with autism in particular, it is increasingly becoming recognised that many "do not engage with the classroom-based experiences presented" (Carpenter & Egerton, 2007, p. 10), and thus present a unique challenge in our attempts to promote engagement and learning. According to Carnahan, Musti-Rao & Bailey, (2009, p. 37) "the wide range of behaviors that encompass the spectrum make students with autism less available for learning, or less engaged, during academic instruction." This view is corroborated by Keen (2008, p. 1) who states that:

> *"One of the most difficult problems affecting children with autism is their failure to engage with the world around them. This is a major challenge for educators when trying to teach these children. Finding ways to actively engage these children from an early age is arguably one of the most important tasks for educators as engagement is a gateway to learning and is one of the best predictors for positive student outcomes."*

This represents a significant problem for the successful education of these children, since "when unengaged, students lose out on important learning opportunities and may become distracted, disruptive, or may demonstrate challenging behaviours" (Hume, 2006, p. 1). Moreover, "engagement has been identified as an essential ingredient in programs for young children with autism" (Ruble & Robson, 2007, p. 1458), and according to the National Research Council (2001b), a minimum of 25 hours per week of actively engaged time is essential for children with autism.

Research reveals that when the engagement levels of students with autism improve, following effective interventions such as visual schedules, this correlates with greater achievement and lower levels of challenging behaviour (Bryan & Gast, 2000; Hall et al., 1995; Horner et al., 2002; MacDuff et al., 1993; Pierce & Schreibman, 1994). Furthermore, studies suggest that when interventions successfully improve the social engagement of students with autism, this correlates with improvements in communication and social skills and reductions in stereotypic behaviour (Greenspan & Wieder, 1999; Libby, Powell, Messer & Jordan, 1997; Wimpory, Hobson & Nash, 2007).

Clearly it is therefore essential that schools educating students with disabilities such as ASDs make every effort to ensure that their engagement in learning is optimised. However, due to the unique learning styles and needs presented by students with autism (see chapter 3) "if we … do not continue to change to meet the needs of the children and young people we serve, then our schools, and the pedagogy they employ will become obsolete" (Carpenter, 2007c, p. 10).

4.1.3 Engagement and the Environment

To date, considerable research has shown engagement to be a critical variable that mediates between the environment and achievement (Altman & Kanagawa, 1994; Greenwood, Carta & Dawson, 2000; McWilliam & Bailey, 1992; McWilliam & Bailey, 1995; McWilliam et al., 1985). McWilliam & Bailey (1992, p. 238) emphasise that "the factors contributing to high levels of engagement can be grouped under three headings: (a) the physical environment, (b) the social environment, and (c) the teaching method." Numerous studies have to date supported this theory, reiterating the importance of these three areas of the learning environment (as identified in chapter 3) for promoting the engagement and learning of students with ASDs (Doke & Risley, 1972; Hall et al., 1995; Jones, 1988; Krantz & Risley, 1977; MacDuff et al., 1993; McWilliam et al., 1985; Montes & Risley, 1975; Raspa, McWilliam & Ridley, 2001; Sarokoff, Taylor & Poulson, 2001).

For children with autism in particular, research surrounding the impact of the physical classroom environment on student engagement has tended to focus on the benefits of structuring the learning environment. A clear visual physical structure has been shown to facilitate students' understanding of which activities take place in which area of the

classroom, reduce distraction and sensory overload, and support their engagement in learning (Heflin & Alberto, 2001; Heflin & Simpson, 1998; Iovannone et al., 2003; Mesibov et al., 2004). Additionally, as mentioned in section 3.2.4, an abundance of research has also studied the effects of the teaching approach and resources on students with autism, and has found that the use of visual strategies (such as photographic or symbolic activity schedules) increases their engagement in learning (Bryan & Gast, 2000; Hall et al., 1995; Hume & Odom, 2007; MacDuff et al., 1993; O'Reilly, Sigafoos, Lancioni, Edrisinha & Andrews, 2005).

Many studies have also investigated the effect of the social environment (caregiver and teacher style) on the engagement of children with autism. These studies have consistently found that a responsive style of interaction is positively correlated with improvements in children's social interactions as well as their social emotional functioning, with findings suggesting that a responsive approach increases both children's attention and their initiation of social interaction (Kishida & Kemp, 2009; Mahoney & Perales, 2003; Mahoney & Perales, 2005; Mahoney & Wheeden, 1999; Mahoney, Wheeden & Perales, 2004; Wimpory et al., 2007). Mahoney & Wheeden (1999, p. 64) concluded that "teachers' interactive style contributed significantly to both the quality and frequency of children's engagement with their teachers … teacher responsiveness (i.e., involvement, child orientation) correlated positively with children's initiation."

Collectively, these findings reaffirm the conclusions from chapter 3, highlighting that the physical environment, teaching approach and social environment are crucially important factors requiring consideration in order to fulfil the aim of this study - to develop a learning environment which supports students with profound autism to engage as effective learners.

4.2 Measuring Engagement in Learning

With the growing emphasis on engagement as a key indicator for learning, numerous tools for measuring engagement have been created. Two distinct types of tools have been developed: (i) indirect methods such as questionnaires which facilitate caregivers, practitioners or students themselves through self-report to assess global engagement after a learning task has taken place, and (ii) direct observation systems which enable researchers to determine either group or individual student engagement through

observing students during a learning task. A direct observation system was considered to be most useful to fulfil the aims and objectives of this study since it enables "observing what children are actually doing" whilst they are doing it (Kishida & Kemp, 2006b, p. 4). Consequently, a review of existing direct observation scales previously utilised in other studies was undertaken. The review was limited to scales developed around children in the early years and those with disabilities, since these were considered to hold the greatest potential for use in the present research.

To explore the suitability of existing scales for use in this study, three selection criteria were identified, based upon the aims and objectives of this research and the definition of engagement outlined in section 4.1.1. These selection criteria were:

- sensitivity to the levels of engagement exhibited by children with profound autism
- applicability to a variety of classroom activities and situations including 1:1 work, independent work, group work and choice time.
- to be cost and time effective, easy to use and not require specific training or equipment

4.2.1 Scales Measuring Engagement of Students in Early Years Education

Throughout the 1990s, McWilliam and colleagues developed various engagement scales for use within early years settings. The direct observation systems they developed include The Engagement Check II designed to measure group engagement (McWilliam, 1999), and The Engagement Quality Observation System III (E-Qual III) designed to measure individual engagement (de Kruif & McWilliam, 1999; McWilliam & de Kruif, 1998).

The Engagement Check II has successfully allowed researchers to assess the percentage of children engaged in appropriate behaviour during a group activity (Raspa et al., 2001; Ridley et al., 2000) , it defines engagement only as a dichotomous variable (engaged vs non-engaged) and thus it was not considered that it would be sensitive to the levels of engagement exhibited by children with profound autism. The E-Qual III on the other hand does allow a more in-depth analysis of engagement through recording both the level and focus of engagement observed. However, it

identifies eleven levels of engagement sequenced from sophisticated to unsophisticated (McWilliam & de Kruif, 1998; Raspa et al., 2001).

Whilst such a detailed measure of the levels of engagement could potentially provide extremely insightful data, the levels categorised as sophisticated engagement require higher levels of cognitive development, which may be difficult to achieve for children with severe disabilities who have significant cognitive delays (Kishida & Kemp, 2006a), such as those involved in the present study. In addition, the requirement for video recording and specialised computer systems also precluded its use in the present study due to financial and training issues.

Ecobehavioural observation systems such as the Ecobehavioural System for Complex Assessment of Preschool Environments (ESCAPE) (Greenwood et al., 2000), the Code for Active Student Participation and Engagement – Revised (CASPER) (Odom, Favazza, Brown & Horn, 2000) and the Early Childhood Environment Rating Scale – Revised (ECERS-R) (Harms, Clifford & Cryer, 1998) measure a child's engagement as one a number of subcategories of children's behaviour, alongside measures of teacher's behaviour and multiple ecological classroom variables.

Such measures are useful for simultaneously examining multiple variables affecting children's engagement in a classroom. However, the systems are extremely complex to use due to the large number of behavioural categories requiring coding (Bramlett & Barnett, 1993; Odom et al., 2000). Furthermore, like the E-Qual III, these measures also require a laptop computer and specialised software (Greenwood et al., 2000; Odom et al., 2000), which, although enabling simultaneous observation and analysis which is extremely time-effective, again precluded their use in the present study due to financial and training issues. Furthermore, it has also been suggested that these measures may not be sensitive to the engagement levels of children with severe disabilities (Kishida & Kemp, 2006a), such as those involved in the present study.

4.2.2 Scales Measuring Engagement of Students with Disabilities

In addition to the scales developed to assess the engagement of children in the early years, a number of studies have now focused on the engagement of children with disabilities, including children with developmental delay (Almqvist, 2006; Bevill, Gast, Maguire & Vail, 2001; Kishida & Kemp, 2006a; Kishida & Kemp, 2006b), attending

problems (Godfrey, Grisham-Brown, Schuster & Hemmeter, 2003; Junod, Rosemary, DuPaul, Jitendra, Volpe & Cleary, 2006; Zanolli, Daggett & Pestine, 1995) behavioural problems (Del'Homme, Sinclair & Kasari, 1994) and autism (Keen & Pennell, 2010; Kishida & Kemp, 2009; Konaka, 2007c; Morrison, Sainato, Benchaaban & Endo, 2002; Reinhartsen, Garfinkle & Wolery, 2002; Shearer, Kohler, Buchan & McCullough, 1996).

A recently developed engagement scale designed to distinguish the levels of engagement of students with severe disabilities is the Individual Child Engagement Record (ICER) (Kishida & Kemp, 2006a; Kishida & Kemp, 2006b). The ICER measures two dimensions of child engagement (a) level of engagement (b) use of physical prompt to guide or facilitate engagement. The scale measures five levels of engagement: active engagement, passive engagement, undifferentiated engagement, active non-engagement and passive non-engagement, and two physical prompt codes: occurrence or non-occurrence.

Kishida & Kemp found that this scale provided a useful measure of a child's active or passive engagement in a selection of activities. They observed that it could be used to select activities for which individual children demonstrated the highest levels of engagement, thus providing the greatest opportunities for learning. Conversely the scale could also be used to identify activities requiring modification due to low levels of engaged behaviour. In addition, the spontaneity of engagement could also be measured by recording the need for physical prompts (Kishida & Kemp, 2006a). For the purposes of the present study, this scale was considered to largely meet the selection criteria identified above, but it would require subtle modification to ensure both sensitivity to the levels of engagement exhibited by children with profound autism, and applicability to a variety of classroom activities and situations including 1:1 work, independent work, group work and choice time.

Another engagement scale specifically designed around the needs of students with autism is that devised by Konaka (2007c) in order to assess the success of an adapted teaching approach aimed specifically at engaging students with autism in sessions of Sherborne Developmental Movement (SDM). In order to determine the extent to which the students were engaging in the various movements, Konaka formulated an engagement scale which measures five levels of engagement, ranging from authentic engagement (most engaged), through passive engagement, ritualistic engagement,

retreatism and finally to refusal (least engaged). The scale also distinguishes between six different behaviours associated with engagement and six different prompts.

By breaking down recordings into these various options, the scale enables evaluation of not only the extent to which the child is engaging in the activity, but also which engaged behaviours the activity promotes, which types of prompts are required to produce engagement, and the spontaneity of engagement. However, whilst this scale provides a very useful measure of engagement for this population of students, its usefulness is limited by both its specificity to SDM sessions, and the complexity of the data collection process. Consequently, whilst aspects of the levels of engagement devised in this scale were identified as suitable for the present study, it was considered to require substantial modification to be effectively used.

The Interaction & Engagement Scale (IES) is another scale designed to measure engagement and interaction of students with severe disabilities (Hunt, Soto, Maier, Muller & Goetz, 2002; Hunt, Soto, Maier, Liboiron & Bae, 2004). This scale collects interaction data regarding the function, quality and partner involved. In addition, the level of engagement (active, passive or non-engaged) and grouping are also recorded. An advantage of the IES is that it does not necessitate extensive training, but due to the large number of variables requiring coding, it is likely that substantial practice would nevertheless be necessary. Furthermore, although the IES records both engagement and interaction, the major focus of the scale appears to be the collection of interaction data, and thus it was not considered suitable for the present study.

Nevertheless, “engagement and interaction data gathered during free play have the potential to be particularly valuable, as the degree of engagement and interaction of children during free play is likely to have a substantial impact on their learning” (Kishida & Kemp, 2009, p. 3). Consequently, due to the importance of providing an environment which facilitates social engagement, as highlighted in chapters 3 and 4, identifying a tool to assess social engagement during choice time was considered to be important for the present study. Kishida & Kemp (2009) use a revised version of the ICER (ICER-R), specifically to assess the social engagement and interaction of students with autism during free play.

In the ICER-R, undifferentiated engagement was removed as a coding level for engagement, and interaction was included as a core category. Verbal and gestural prompts were also removed, while space was instead made for recording anecdotal qualitative information about the observation (Kishida, Kemp & Carter, 2008). Once again, the volume of recorded variables precluded using this scale in the present study. Nevertheless, the ICER-R was considered to provide a useful model for recording the extent of social interactive engagement with another person during choice time and thus this aspect of the scale was considered to be particularly important for the present study.

Having reviewed the existing scales considered to hold the potential for use within the present study, it was clear that for the reasons discussed above, none of the scales met all of the selection criteria listed at the beginning of section 4.2. As a result, an additional objective of this study became to devise engagement scales sensitive to the learning profiles of children with ASDs. To this end, aspects of the Engagement Check II, the E-QUAL III, the IES, the ICER, the ICER-R and the SDM scales were combined and collated to produce novel engagement scales sensitive to the unique and complex learning styles of the students involved in the present study. A more detailed outline of the process involved in creating these scales and the elements utilised from each of the previously existing scales discussed above shall be provided during the methodology discussion in chapter 7.

4.3 Conclusion

From the literature discussed in chapter 4, it is clear that for students with ASDs, engagement is a crucial predictor of effective learning, and the environment (including the physical environment, social environment, teaching approach and resources) is an important factor influencing student engagement. Furthermore, since students with autism have been shown to spend less time engaged in developmentally appropriate learning activities than their non-disabled peers, the aim of this research – to develop a learning environment which supports students with profound autism to engage as effective learners - is of fundamental importance to enable students with ASDs to fulfil their learning potential.

CHAPTER 5
AUTISM AND THE ENVIRONMENT

5.0 Overview

As outlined in the previous chapter, engagement is an essential mediating factor for effective learning, and the learning environment is an important resource to promote student engagement in learning, particularly for students with disabilities. Furthermore, the literature discussed so far indicates that for students with autism, providing a learning environment which promotes social engagement and accommodates the sensory difficulties and learning styles characteristic of autism are of particular importance. The following chapter will now review the existing literature available surrounding the design of environments for individuals with autism from an educational perspective in order to ascertain how this can be used to inform the design of an optimal learning environment for students with autism.

5.1 Environmental Design for Autism

In recent years there has been increasing acknowledgment that students with special needs require specifically designed environments to promote their engagement in learning (Carbone, 2001; Reiber & McLaughlin, 2004; Schilling & Schwartz, 2004). Furthermore, the importance of 'universal design' is now increasingly being emphasised to facilitate access to education for individuals with physical impairments (Bowe, 2000). However, this is not generally extended to address the needs of individuals with significant cognitive or sensory impairments, such as those with ASDs (Khare & Mullick, 2009a; Khare & Mullick, 2009b). Indeed, according to the Mike Collins, the Head of Education for the NAS (2006):

> *"Current provision for those with the disability is deeply inadequate given the scale of the need. Autism is a lifelong disability and when an individual's needs are not met the long-term consequences both financially and for the individual's well-being are profound."*

At present there is very little guidance of any kind on designing built environments for individuals with ASDs. Moreover, to date the majority of research surrounding optimum built environments for individuals with ASDs has focused on living environments, and been largely discursive, highlighting the need to build an evidence-base of research in this area (Beaver, 2003; Beaver, 2006; Beaver, 2010a; Beaver, 2010b; Humphreys, 2005; Nguyen, 2006; Plimley, 2004; Scott, 2009; Whitehurst, 2006a; Whitehurst, 2006b). Nevertheless, Plimey (2004, p. 36) emphasises that both "within-people

qualities" and "environmental considerations" of the building require thought. Whitehurst (2006b, p. 31) reiterates this, highlighting that "space, staff and resources are key issues."

This correlates with the literature review undertaken in the previous three chapters, which indicated that in order to develop a learning environment which accommodates the social and sensory-perceptual impairments characteristic of autism, it is important to consider:

- the social environment (e.g. teacher style, to facilitate students' social engagement)
- the teaching approach and resources (to target their visual and kinaesthetic learning styles)
- the physical learning environment (to accommodate the sensory processing and regulatory problems experienced by individuals with autism).

Consequently, in order to fulfil the aim of this study – to develop a learning environment which supports students with profound autism to engage as effective learners - the learning environment was defined to include: (i) the physical environment (ii) the teaching approach and resources (iii) the people in the environment (staff and peers).

5.1.1 The Physical Environment

"Children on the autistic spectrum are amongst the most vulnerable groups in our society. This largely stems from the overwhelmingly disabling effects of a sensorily handicapping built environment (BE) within which they have to perform" (Shabha, 2004, p. 1). As discussed in sections 3.2.3 and 3.2.4, there is an abundance of neurological research suggesting that individuals with autism find their environment increasingly overwhelming as they attempt to make sense of the abundance of different stimuli in their surroundings (Belmonte et al., 2004b; Burack et al., 1997; Wainwright & Bryson, 1996). This is affirmed by Heflin & Alberto (2001, p. 94) who emphasise that "problems processing environmental stimuli are one of the core deficits in individuals with ASD that contribute to learning difficulties."

As mentioned in section 4.1.3, research surrounding the physical design of educational environments for students with ASDs has for many years largely focused on the

benefits of providing a highly structured physical environment to support students with autism to engage in learning (Heflin & Alberto, 2001; Heflin & Simpson, 1998; Hume & Odom, 2007; Iovannone et al., 2003; Mesibov et al., 2004; Mesibov & Howley, 2003; Mesibov & Shea, 2008; Hume, Loftin & Lantz, 2009). For example, it has been identified that "boundaries can be established with materials or furniture, such as placing bookshelves between work areas, or through contrived means such as putting masking tape on the floor to indicate where students are to assemble" (Heflin & Alberto, 2001, p. 94). Nevertheless, it has also been observed that classroom size, wall colour, type of furniture and the amount of natural and artificial light can all influence how students learn (Dodge & Colker, 1996; Lawry, Danko & Strain, 2000).

According to Brawne (1992) the sensory stimuli that one encounters on a daily basis are considerably influenced and often controlled by design aspects of the built environment, including boundaries, colours, texture and sound. For a typically developing young child, learning to identify relevant stimuli from the world around them through their senses is a natural part of their overall development (Thies & Travers, 2001). However, for the child with autism who has a dysfunctional sensory system, being bombarded by irrelevant sensory stimuli from the environment could lead to further processing difficulty, distractibility, agitation, and a subsequent inability to engage in learning, amongst other problems (Shabha, 2004).

This is a view which is reiterated by many high functioning individuals with autism. For example, Holliday-Willey (1999, p. 22) describes her reaction to busy environments:

> *"I found many noises and bright lights nearly impossible to bear. High frequencies and brassy, tin sounds clawed my nerves. Whistles, party noisemakers, flutes and trumpets and any close relative of those sounds disarmed my calm and made my world very uninviting. Bright lights, mid-day sun, reflected lights, strobe lights, flickering lights, fluorescent lights; each seemed to sear my eyes. Together, the sharp sounds and the bright lights were more than enough to overload my senses."*

Clare Sainsbury (2009), a lady with Aspergers Syndrome, reveals that the school environment, with its noisy, busy corridors, frequent ringing bells and overwhelming smell of cleaning products constantly brought her to the brink of sensory overload. Furthermore, Cheng & Boggett-Carsjens (2005, p. 44) describe the world as perceived by a 9 year old boy with autism:

> *"Picture yourself calm and relaxed. Suddenly, a stereo blasts in your ears, and you are punched in the arm. This would be frightening, painful and overwhelming. For someone with sensory processing problems, such auditory*

> *hypersensitivity might occur in a noisy classroom or hallway. Such touch hypersensitivity might occur with the routine jostling in a school corridor, or the accidental touching by a peer. In other words, every day life becomes overwhelming."*

It is also suggested that there may be important links between the environment, sensory overload, and the prevalence of self-stimulatory and challenging behaviours exhibited by individuals with ASDs. As highlighted in section 3.2.4, it is increasingly recognised that many individuals with ASDs utilise self-stimulatory behaviours to assist them in regulating their sensory systems or to block out sensorily overloading environments (Bogdashina, 2003; Jordan & Powell, 1995; Shabha, 2006). Furthermore, the challenging behaviours exhibited by many individuals with autism may be an involuntary response to an overstimulating environment. Cheng & Boggett-Carsjens (2005, p. 44) describe how for a 9 year old boy with autism:

> *"Precipitants for his rages were "everything" and included: Triggers such as sound and touch. Sound triggers included normal noisy situations, as seen on the school bus, playground, gymnasium or lunchroom … Touch triggers included any accidental touching by others, which would lead to violence at his perceived attackers."*

Furthermore, the authors continue to highlight that "problems with rages were due to his being under continual sensory overload. As a consequence of this overload, his nervous system perceived that he was in a constant state of danger, thus responding with 'fight' (rages, tantrums) or 'flight' (withdrawal, shutting down)" (Cheng & Boggett-Carsjens, 2005, p. 44). Dumortier (2004, p. 31), an autistic individual, reiterates this, describing how "the world often scares me … one stimulus can be so overwhelming … I begin to panic or my temper flares up … my feelings at that point can best be described as a survival instinct."

This raises important questions regarding the suitability of current educational environments for the engagement in learning of students with autism. If the environment is sensorily overloading, so that the student with autism is anxious and on the brink of the 'survival instinct', how can they be expected to achieve a calm emotional state essential for effective learning? (Caine & Caine, 1994; Chaffar & Frasson, 2005). Indeed a number of studies have shown that "students who are … anxious could not retain knowledge and think efficiently" (Chaffar & Frasson, 2005, p. 1). In addition, if students are employing self-stimulatory behaviours to block out the environment due to sensory overload, how can they be expected to engage in learning?

According to Temple Grandin, a high-functioning lady with autism, controlling sensory stimulation is essential if one is to ensure the environment is sufficiently comfortable and non-threatening for learning to occur (Grandin & Scariano, 1996; Grandin, 2006; Grandin, 2008). This view is also supported by Peeters (2003, p. 16) who describes adapting the environment as a way "to get people who live in chaos out of the chaos, so that they find some meaning and/or order." Furthermore, Ofsted have raised growing concerns that the quality of the learning environment in many special needs schools does not currently meet the growing needs of students who exhibit a variety of sensory processing problems, such as those with ASDs (Ofsted, 1999).

It is therefore becoming increasingly clear that due to the sensory processing difficulties experienced by individuals with autism, the physical environment is a key element to consider when designing educational environments for this group of users. According to Henry (2006, p. 3) "designing an environment to help individuals cope with the perceptual sensory aspect of autism could tremendously improve their quality of life." This view is reiterated by Baranek, (2002, p. 2) who states that:

> *"Given that many conventional educational environments are sensorily complicated and unpredictable, interventions likely need to consider the individualized sensory processing needs of children demonstrating such difficulties to optimize successful participation in such programs."*

Due to the sensory processing difficulties experienced by individuals with autism, it is likely that the effective design of educational buildings for this group of students will contradict much of the conventional architectural norms for educational facilities (Bogdashina, 2003; Moore, 2007; Wing, 2007). According to Bogdashina (2003, p. 17) "unfortunately most educational environments are all about the very things that are the strongest sources of aversion [for students with ASDs]." Moore (2007, p. 36) also supports this view, highlighting that "autists often have sensory hypersensitivities, and the designers of mainstream school buildings do not take these into account." Furthermore, Wing (2007, p. 28) states that "a mainstream school exposes them [autistic students] to a noisy, brightly lit, ever-changing environment that they find terrifying."

In addition, Charlotte Moore (2007, pp. 34-36), a mother of two autistic sons (George & Sam) and one normally developing son (Jake) reveals that:

> *"When I looked for a suitable school for Jake, I wanted the very features that would have been anathema to George and Sam. Lots of variety … colourful*

> *displays of the children's work … But for George and Sam such an environment is overwhelming … In schools specifically designed for autistic children, dull quiet colours are used on the walls, and floor colours are plain and uniform."*

It is thus perhaps unsurprising that as highlighted in section 2.5, many students with autism experience failure in mainstream school. The NAS report that one in five pupils with the condition are excluded at least once, compared with an estimated 1.2% of the total student population (NAS, 2007).

However, what constitutes an autism-friendly sensory environment has yet to be established through sound scientific research, highlighting a very real need for research in this area. This may be due in part to the complexity of issues involved, and to the varying degrees with which factors affect individuals. Whilst sensory processing problems are exhibited by the majority of individuals with ASDs, the way in which this manifests varies for each individual (Greenspan & Wieder, 1997; Kranowitz, 2005), an issue which will be discussed further in chapter 12.

A few consistent findings have persisted through the literature, however they have tended to be "univariate and prescriptive in scope … assessing the impact of single environmental factors on a restricted aspect of the learning process" (Shabha, 2004, p. 2). Nevertheless, studies confirm that traditional fluorescent lighting can be painful for individuals on the autistic spectrum, causing headaches and migraines due to the invisible flickering (Colman, Frankel, Ritvo & Freeman, 1976; Fenton & Penney, 1985; Kluth, 2004; Winterbottom & Wilkins, 2009). Additionally, background noise has been found to reduce the ability of students with ASDs to perceive speech (Alcántara, Füllgrabe & Weisblatt, 2008; Alcántara, Weisblatt, Moore & Bolton, 2004; Russo, Zecker, Trommer, Chen & Kraus, 2009). If correctly applied, knowledge from such studies has the potential to influence many design decisions for schools for students with autism, from flooring materials to furniture choices and the use of natural light. Consequently, it is clear that the physical environment is a key area requiring investigation in order to fulfil the aim of the present study: to develop a learning environment which supports students with profound autism to engage as effective learners.

5.1.2 The Teaching Pedagogy and Resources

As mentioned in sections 3.2.4, 4.1.2 and 4.1.3, many individuals with ASDs show a predominantly visual learning style, and thus autism-specific teaching approaches such

as TEACCH have been developed. TEACCH builds on the visual preference of many students with ASDs by employing visual schedules (using pictures, symbols, words etc depending on the needs of the individual student), structured visual work systems where tasks are broken down and individually labeled, and clearly designated physical spaces for activities. TEACCH aims to facilitate independence and autonomy by providing consistent dependable structure and support in order to decrease dependence on adults (Howley & Preece, 2003; Mesibov & Howley, 2003; Mesibov et al., 2004; Mesibov, 1997; Schopler et al., 1995).

There is vast evidence outlining the effectiveness of both the TEACCH approach (Howley & Preece, 2003; Marcus, Schopler & Lord, 2000; Mesibov & Howley, 2003; Mesibov et al., 2004; Mesibov, 1997; Mesibov, Schopler & Hearsey, 1994; Schopler et al., 1995; Schopler, Mesibov & Kunce, 1998) and the general use of visual schedules and systems (Bryan & Gast, 2000; MacDuff et al., 1993; Quill, 1995; Quill, 1997; Wheeler & Carter, 1998; Rao & Gagie, 2006; Tissot & Evans, 2003) for students with autism. According to Panerai et al. (2002), TEACCH "is one of the most valid treatment programs" for improving learning and decreasing problem behaviours in students with autism. Consequently, as mentioned in section 3.2.4, the benefits of visual teaching strategies for students with autism will not be area investigated in any detail through the present study.

However, one area in which it has been suggested that the TEACCH approach may not be adequately addressing the needs of individuals with autism is communication. For example, Panerai et al. (2002) found that students with autism in a TEACCH-based residential program did not show significant improvements in receptive and expressive communication abilities. This is a finding which is consistent with other research examining the influence of TEACCH on communication development (Goldstein, 2002; Noens & van Berckelaer-Onnes, 2004; Ozonoff & Cathcart, 1998).

To address this, the TEACCH approach emphasises the importance of functional communication, and advises making alternative and augmentative communication (AAC) methods such as the Picture Exchange Communication System (PECS) available to nonverbal children to facilitate meaningful communication (Bondy & Frost, 1994; Mesibov et al., 2004; Mesibov, 1997). There is now a large evidence-base to support the "efficacy of the PECS protocol with … children with autism … and

concomitant decreases in problem behavior" (Charlop-Christy, Carpenter, Le, LeBlanc & Kellet, 2002, p. 229; Dodd, 2005; Siegel, 2003). Furthermore, a number of studies have also revealed the benefits which can be gained from using social stories to enhance the social understanding of students with ASDs (Chatwin, 2007; Gray, 1995).

In addition, proponents of the TEACCH approach recommend that "care is taken to … [use] a 'facilitative' (rather than 'directive') style." (Mesibov et al., 2004, p. 72). This resonates with the discussion in section 4.1.3, which highlighted that research has shown a responsive teacher style to facilitate the social engagement of students with ASDs. Recent research has revealed the effectiveness of a number of approaches which emphasise a facilitative or responsive style to enhance the pre-speech, speech and early social skills of students with ASDs, including Sherborne Developmental Movement (Konaka, 2007a; Konaka, 2007b; Konaka, 2007c), colour impact therapy (Pauli, 2004; Pauli, 2007), interactive play (Peter, 2009; Thornton & Taylor, 2007), Intensive Interaction (Nind & Powell, 2000; Nind, 2000; Swinton, 2008) and Proximal Communication (Potter & Whittaker, 2001).

Many researchers now believe that combining approaches is essential to meeting students' complex and individual needs, since the exclusive use of only one teaching approach may result in important aspects of students' social, cognitive and communicative development being ignored (Heflin & Simpson, 1998; Jordan, 2004; Siegel, 1999; Stahmer & Ingersoll, 2004). Siegel (1999, p. 34) claims that "given the heterogeneity in the presentation of ASD, a kind of systematic eclecticism is a clinically responsible approach … There is no intrinsic reason why program features across treatment models can not be combined advantageously." Heflin & Simpson (1998, p. 207) further support this view, advocating that "we firmly believe that there is not a single method that should be exclusively used to meet the varied needs of children and youth with autism … the most effective programs … are those that incorporate a variety of best practices."

Since TEACCH and PECS were already widely and successfully implemented within the research school (Carpenter, Chatwin & Egerton, 2001; Chatwin & Harley, 2007), the provision of a primary teaching approach to meet the educational and communicative needs of students with ASDs was not an area investigated in any detail during the course of this research. Nevertheless, since the literature discussed so far

has highlighted the importance of combining approaches, and of employing teaching approaches which promote kinaesthetic learning (see section 3.2.2) and facilitate social engagement (see section 3.2.1), exploring the classroom-based application of supplemental approaches which place emphasis on these areas will likely be of benefit for students with autism. It therefore seems clear that the teaching approach and resources is another area requiring investigation in order to fulfil the aim of this study - to develop a learning environment which supports students with profound autism to engage as effective learners.

5.1.3 The People in the Environment (Staff and Peers)

The teaching staff within an educational environment for students with profound autism play a crucially important role, since they are responsible for supporting students with ASDs to develop and learn (Helps, Newsom-Davis & Callias, 1999). It has been identified that to be most successful at promoting learning in students with ASDs, teaching staff must have a deep level of empathy with these students, as well as a high level of skill in suitable teaching methods (Brewin, Renwick & Fudge Schormans, 2008; Dawson & Osterling, 1997; Jordan, 2008; Jordan, 2008). Due to the complex needs and learning patterns associated with autism, it has been widely acknowledged that teaching staff supporting students with ASDs must be given adequate training in autism, in order that they may acquire the knowledge and skills required to provide the right support for these students (Barnard et al., 2002).

The importance of training for staff working with students with autism has received much attention in recent years, since a report by the NAS identified that “72% of schools were dissatisfied with the extent of their teachers’ training in autism” (Barnard et al., 2002, p. 7). At present no mandatory requirements exist for the completion of formal specialist training in autism by those teaching students with ASDs (Helps et al., 1999). However, the UK Government recently launched the Autism Inclusion Development Program to assist education staff to increase their knowledge and understanding of autism and improve the way they work with students on the autism spectrum (DCSF, 2009). Furthermore, the recent Salt Review (2010) places emphasis on ensuring that teacher training and continuing professional development courses are available to support those working with students with severe learning difficulties. Since all staff at the research school undertake compulsory and extensive professional development training courses in autism, this will not be an issue investigated during the

course of this research (Chatwin & Rattley, 2007).

In addition, the impact that teacher style can have on the social development and engagement of students with autism is another key factor requiring consideration. According to Helps et al. (1999, p. 288) “they [teaching staff] are vital in fostering the social and communication skills that are so elusive for children with autism.” Furthermore, as highlighted in section 3.2.1, when developing a learning environment to support students with profound autism, it is essential to ensure that the environment facilitates social interaction. Section 4.1.3 and 5.1.2 touched upon research which suggests that teacher style can influence the social engagement of students with ASDs, and that teacher responsiveness correlates with enhanced social engagement (Kishida & Kemp, 2009; Mahoney & Perales, 2003; Mahoney & Perales, 2005; Mahoney & Wheeden, 1999; Mahoney et al., 2004; Wimpory et al., 2007).

According to Ware (2003, p. 1) “a responsive environment [is] … an environment in which people get responses to their actions, get opportunity to give responses to the actions of others, and have the opportunity to take the lead in interaction.” In describing establishing a successful responsive learning environment for Natalie, a young woman with autism, Flo Longhorn (2000, p. 27) reveals that:

> *“In order to provide any education or enable a learning process for Natalie, my objective had to be a simple one. I wanted Natalie to acknowledge me as a human being, relating to me in any manner she chose. Unless Natalie chose to do this, then her education would be a forced and meaningless interaction.”*

For many years now there has been growing recognition of the educational significance of a responsive style of interaction (Mahoney & Wheeden, 1999; Roberts, Bailey & Nychka, 1991; Smothergill, Olsen & Moore, 1971). According to Roberts et al. (1991, p. 361) “responsiveness, that is the degree, timing, sensitivity of the response [is] … the crucial component of communicative interactions.” Furthermore Jenne (1999, p. 70) states that “responsive teaching techniques support the child's interests and yield a greater number of spontaneous initiations from the child.” Moreover, a responsive style of interaction has frequently been recommended for use with students with disabilities including ASDs (Dawson & Osterling, 1997; Escalona et al. 2002; Greenspan, 1992).

Recent research has continued to support this finding (Aldred, Green & Adams, 2004; Mahoney & Perales, 2003; Mahoney & Perales, 2005; Mahoney et al., 2004; Mahoney, Perales, Wiggers & Herman, 2006). A meta-analysis of 13 studies investigating a

responsive approach concluded that responsive style “has a positive influence on the social-emotional development of these children” (Trivette, 2003, p. 5). This finding was common to all 13 studies, which incorporated data from 1,336 children in total. In addition, Mahoney & Perales (2005) found that after one year of weekly responsive teaching sessions, 50 children with developmental problems including autism, attained dramatic increases in development. This included improvements of 60% for cognition, 167% for expressive language, and 138% for receptive language. Furthermore, the 20 children who were diagnosed with autism also made significant improvements in their social emotional functioning, including self-regulation, social competence and atypical behaviours. Since as mentioned above, staff at the research school received extensive training in autism (Chatwin & Rattley, 2007), this was not an area explored in detail through the course of this research. However, an awareness of the impact of teacher style on the engagement and learning of students with autism was nevertheless considered important in order to meet the aims and objectives of the present research.

In addition to the teaching staff, it should also be recognised that there are other people within the learning environment who can have a dramatic impact on the learning and engagement of students with autism: their peers. As highlighted in sections 3.2.3 and 3.2.4, students with autism are often easily distracted and overloaded by external stimuli in the environment. This can result not only from environmental stimuli, but also from the other people in the environment. Consequently, students with autism can be extremely easily distracted by their peers (Hannah, 2002). Due to the nature of this research it was not possible to explore this directly, however an awareness of the importance of peers on the engagement and learning of students with autism was nevertheless considered important in order to meet the aims and objectives of the present research.

5.2 Conclusion

As discussed, it is clear that there is a definite need for research which provides an evidence-base identifying what constitutes a supportive learning environment for students with profound ASDs. They present a unique array of learning needs, styles and teaching challenges, and spend less time engaged in developmentally appropriate learning activities than their non-disabled peers. McKay (2003, p. 207) emphasises that “the range of needs of people with ASD is extensive … they call for autism specific knowledge and interventions to address the triad of social, communication and

behavioural impairments. These impairments have significant implications for … educational placement."

The literature suggests that the physical environment, teaching pedagogy and resources, and social environment are of particular relevance to support the engagement and learning of this group of students. However, there is a comparative lack of research providing an evidence-base for the physical design of educational environments to support individuals with autism to engage as effective learners. As such, in order to inform the design of the new school build, the primary focus of this research will be the physical environment. Nevertheless, since the literature discussed so far has highlighted the importance of employing teaching approaches which promote kinaesthetic learning (see section 3.2.2) and facilitate social engagement (see section 3.2.1), these shall also be considered in order to fulfil the aim of this study: to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners.

CHAPTER 6
RESEARCH METHODOLOGY – GENERAL CONSIDERATIONS

6.0 Overview

This chapter presents a discussion of the key issues influencing the selection of an appropriate research strategy, research design and data analysis approach in order to fulfil the aim of this study – to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners. Further discussion of the selection and development of specific research techniques and tools for use in the present study shall take place in chapter 7.

6.1 Formulating Research Questions

Based on the literature review discussed through chapters 2-5, 3 research questions were formulated from the research objectives in order to assist in focusing this research and to aid the selection of appropriate research methods. The research questions formulated were:

1. What features of the classroom learning environment, (with a focus on the physical environment of the classroom), influence engagement in students with ASDs?
2. What does an engagement scale sensitive to the learning profiles of students with ASDs look like?
3. What influence do trialled modifications to the learning environment have on student engagement?

6.2 Listening to the Students

When planning to create a new educational facility for any students, as is the purpose of the present study, there are many reasons why those involved in designing the school should seek the views of the students who will ultimately attend the school. In recent years there has been an increasing emphasis placed on the importance of involving students as much as possible in making decisions about issues which will in practice directly affect them (Woolner, Hall, Wall & Dennison, 2007). Student voice is a relatively new concept in the field of education, however it is a notion underpinned by the UN Convention on the Rights of Children (1989), which two decades ago initiated a shift in public thinking towards acknowledging the importance of listening to children's

views. Article 12 of this Convention specifically states that children and young people should be included and involved in the decision making process for structures and initiatives which concern them. In addition, the revised SEN Code of Practice (DfES, 2001a) and associated SEN Toolkit (DfES, 2001b) stressed the importance of generating a 'listening culture' in schools in order to hear the views of children with SEN.

More recent policy changes have also served to encourage UK schools to prioritise student consultation. The revised Office for Standards in Education (Ofsted) framework (2009) requires that they take account of students' views during self-evaluation. The Children Act (2004) includes the five outcomes of Every Child Matters, of which the outcome "make a positive contribution" in particular provides a strong platform for student consultation (DfES, 2004a). Furthermore, the Lamb Review (2009, p. 6) on SEN Disability Information also highlights the benefits which can be reaped when student voice is acknowledged in the provision of education, stating that:

> *"The Inquiry has seen the benefits where schools have involved disabled pupils in the development of the school's scheme: this provides insights into what makes school life difficult for disabled pupils, what frustrates their learning and participation; and disabled pupils come up with practical, often simple, suggestions for how the school might make changes."*

In addition to these policy changes, much research over the past ten years has shown an increasing awareness by schools that students can and should play a crucial role in improving their educational provisions (Shallcross, Robinson, Pace & Tamoutseli, 2007). Fundamentally, as succinctly stated by Williams & Hanke (2007, p. 52), "if educational provision is specifically designed to account for the way in which pupils view the world and includes consideration of the elements most important to them it is more likely that pupils will fully engage with the learning opportunities presented." Consequently, in recent years there has been an increasing conviction by many that when designing schools, students' views on learning environments should be considered (Burke & Grosvenor, 2003; Clark, 2005; Clark, McQuail & Moss, 2003; Frost & Holden, 2008).

In 2008, Partnerships for Schools (PfS), the organisation responsible for spearheading the Government's Building Schools for the Future (BSF) campaign, announced that it would be revising its Strategy for Change documentation to recommend that all authorities entering the BSF programme get pupils more involved in the design process

for their schools. According to a PfS press release, their experience showed that it is important for students and staff to be involved in the design process in order to promote a sense of ownership of the school. One way in which this is achieved is through JoinedUpDesign BSF workshops run by the Sorrell foundation, where pupils are supported to create a design brief for what they want in their schools (PfS, 2008; Sorrell & Sorrell, 2005).

Despite this shift in attitude, a key debate which continues to surround student consultation concerns the extent to which children and young people have the competency to effectively inform the consultation process (Hill, 2005), and whether they understand the world enough to give a view which should be listened to (Wyness, 1999). However, James & Prout (1997), state that the conventional ideologies which render students passive for such reasons, are seriously flawed since they fail to recognise the important contribution that students can make to the decision making process in schools. Indeed as far back as 1985, specialists in children's environments Rivlin & Wolfe emphasised the positive contribution of ideas and vision which students can bring to classroom innovation (Rivlin & Wolfe, 1985).

More recently, Rudduck & Flutter (2003, p. 2) stated that schools should:

- *"take seriously what students can tell us about their experience of being a learner in school – about what gets in the way of their learning and what helps them to learn; and*
- *find ways of involving students more closely in decisions that affect their lives in school, whether at the level of the classroom or the school"*

It would therefore seem clear that pupil participation and consultation in the design and redesign process of schools and classrooms is an essential element of any school redevelopment if the new school is to be successful in promoting maximum levels of engagement in learning (Woolner et al., 2007). Furthermore, in order to ensure that students' views are taken seriously, it is essential that their authentic participation in the design process is facilitated through adult support (Hart, 1997), and that schools effectively model processes of consultation and participation to educate their students.

As highlighted through chapters 3 and 5, for students with ASDs, sensory aspects of the environment have been shown to be of particular significance (Bogdashina, 2003; Plimley, 2004; Shabha, 2004; Whitehurst, 2006b). Consequently, the way in which they

perceive their environment may contribute towards highly distinctive views of what they consider to constitute an ideal educational environment. Therefore, incorporating the students' views when designing educational provision for them would seem to be of vital importance. In the context of the current research, this therefore lead to the dilemma of how to ensure that student voice was strongly represented in the design of their new school in order to most effectively answer the research question of 'what features of the classroom learning environment, (with a focus on the physical environment of the classroom), influence engagement in students with ASDs?'

An ideal methodology would have centred around discussions with the students regarding what they felt would constitute their ideal classroom (Williams & Hanke, 2007). Plimley & Bowen (2006, p. 8), state that, "in order to design for people with ASD, there are a number of principles that could apply. The primary one is to consult the people for whom it is intended." However, as discussed in section 3.2, individuals with autism experience a triad of social impairments. Furthermore, many of the students at the school have a co-morbid diagnosis of severe learning difficulty. Consequently, the majority of students at this school have limited verbal skills, a limited ability to understand verbal communication, and difficulties in understanding abstract concepts (Wing, 2007). Indeed McKay (2003, p. 108), highlights that "intrinsic to autism are impairments in insight, understanding and communication, together with a high occurrence of severe disabilities in learning. Opportunities for direct involvement in decisions are often even more difficult for people with ASD than for those with learning disabilities in general."

Nevertheless, Clark & Moss (2001, p. 5) state that:

> *"It is important to understand listening to be a process which is not limited to the spoken word. The phrase 'voice of the child' may suggest the transmission of ideas only through words, but listening to young children, including pre-verbal children, needs to be a process which is open to the many creative ways young children use to express their views and experiences."*

For these reasons, alternative methods of listening to the voice of the students were researched and implemented during the course of this study, and shall be discussed in more detail in chapter 7. However, in addition to employing specifically adapted methods to directly gain students' voices, it has also been highlighted that when undertaking research to obtain the views of non-verbal students, indirect methods of acquiring students' voices should also be utilised. Based on this view, Clark & Moss

(2001) developed a framework for listening to the voices of young and pre-verbal children which they entitled 'The Mosaic approach' since it emphasises the use of a "multi-method approach which brings together children's own views with those of family members and staff" (Clark & Moss, 2001, p. 11). This approach emphasises the importance of combining: (i) student observation (ii) direct methods of obtaining students' voices (iii) parents' perspectives (iv) practitioners' perspectives.

Whilst the Mosaic approach was developed initially for young children, the similarities between the difficulties involved in acquiring the views of pre-verbal and non-verbal children cannot be over-looked. Beresford et al. (1997, p. 181) adhere to this view, stating that, "despite its origins within early years childcare research, the [Mosaic] approach seemed to have potential for working with children with autistic spectrum disorders." Furthermore, the emphasis on a multi-method approach, and the elements included within it, are concepts which have been reiterated by professionals discussing approaches specifically aimed at obtaining the voices of students with autism. For example, Jones (2006, p. 548), outlines that "for children who are not easily able to 'tell' others about their views and experiences, then adults who know them well can be consulted." Furthermore, according to Wing (2007, p. 33), "many children with autistic disorders cannot express their feelings in words, but skilled observation of their behaviour … at school, in the playground as well as in the classroom, is the best guide to the effect that school is having upon them."

Consequently, in order to ensure that the students' voices strongly influenced the design of the new school, it was clear that the research methodology selected for use in the present study must enable students, parents and practitioners to be 'co-constructors' in the development of an evidence-base to inform the research findings. Furthermore, it was essential for the research to be sensitive to the non-verbal communication of the students. With this in mind, a review of methodological approaches was conducted to identify the most suitable methodological framework with which to answer the research questions.

6.3 Research Paradigms: Quantitative and Qualitative Approaches

Research has been defined generally as "a systematic investigation to find answers to a problem" (Burns, 2000, p. 3). For Delamont (2002 preface) "doing research is a similar exercise to going on a voyage of discovery", and for Robson (2002, p. xv)

research “is simply another word for enquiry.” At its most simplistic level then, it can be considered that all types of research and enquiry stem from the human desire to expand our understanding and comprehension of the world in which we live (Dzurec & Abraham, 1993). However, traditionally a distinction has always been made between the positivist paradigm which utilises quantitative research and the interpretivist paradigm which incorporates qualitative methods (McEvoy & Richards, 2006). Consequently, researchers have long debated the relative value of qualitative and quantitative inquiry (Patton, 1990), and a substantial amount of research has tended to be polarised into either quantitative or qualitative research (Brown & Dowling, 1997).

However, more recently researchers are increasingly concluding that “the practice of dichotomising and polarising … research into quantitative and qualitative modes is overdone and misleading” (Burns, 2000, p. 14), that “to perpetuate the debate and the perception of opposition between quantitative and qualitative perspectives is unproductive” (Bordage, 2007, p. S126) and that the quantitative-qualitative “debate is much ado about nothing” (Trochim, 2006). Furthermore, it is now frequently observed that “both the qualitative and quantitative paradigms have weaknesses which, to a certain extent, are compensated for by the strengths of the other” (Steckler, McLeroy, Goodman, Bird & McCormick, 1992, p. 1). Consequently, many researchers now advise that the decision as to which approach to employ should derive from the research goals, the research subject, the research aim, and the researcher’s belief, rather than a rational or logical analysis of paradigms (Maxwell, 2005).

According to Maxwell (2005, p. 25), there are three practical goals to which a qualitative research approach is particularly suited:

1. “generating results and theories that are understandable and experientially credible, both to the people you are studying and to others”
2. “conducting formative evaluations, ones that are intended to help improve existing practice rather than to simply assess the value of the program or product being evaluated”
3. “engaging in collaborative or action research with practitioners or research participants”

Since, as highlighted in section 6.2, the present study aimed to collaborate with students, practitioners and parents within a special school in an attempt to co-construct an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs, in order to generate findings which the research school could utilise to inform the design of new classrooms, an overall qualitative approach seemed most fitting for the purpose of this inquiry.

6.4 Research Strategy: 'Grounded' Participatory Action Research

Having selected a qualitative research approach for the present study, it was now necessary to identify more specifically the appropriate strategy of qualitative research by which to effectively advocate student voice through the Mosaic approach in order to address the issue of identifying what constitutes a supportive learning environment for students with profound autism. According to Denscombe, (2007, p. 267) "qualitative research is an umbrella term that covers a variety of styles of social research, drawing on a variety of disciplines." Indeed Tesch, (1990) lists 26 distinct styles of qualitative research, a list which is undoubtedly not exhaustive.

Nevetheless, the unique setting in which this research took place immediately made it clear that a participatory action research (PAR) approach was the ideal strategy to employ for the present study. As discussed in section 6.2, the complex needs of the students at this school limited the extent to which the students could be directly questioned regarding their views on an appropriate learning environment. Consequently, since PAR is an approach which allows for the collection of data from within real-life contexts (Robson, 2002), this particularly suited the aim of the present study by enabling the students' behaviour and actions within their learning environment to speak where their words could not, as advocated by the Mosaic approach (Clark & Moss, 2001).

In addition, this opportunity for naturalistic observation provided by PAR offered the chance to undertake research with this group of students without removing them from their familiar environment, or interrupting the well-established routines involved in their daily care and education which are essential to reduce the students' levels of anxiety and assist them in remaining calm. As such, it is more likely that by using a PAR approach the findings will provide an accurate representation of the students' behaviour. Furthermore, since a standard working classroom was available to utilise for

the purpose of naturalistic observation, this provided an ideal setting within which to conduct a PAR spiral.

Secondly, PAR is a research process which advocates researching teaching practice *actively* with the intention of understanding the needs, views and difficulties of the students in order to see how their needs can be responded or attuned to (Flornes, 2007). The terms 'action' and 'research' highlight this essential feature of PAR, namely the concept of actively trying out ideas in order to increase knowledge and improve practice (Kemmis & McTaggert, 1990). Fundamentally, this unique quality of PAR enabled a concrete approach to be taken such that students actively experienced, encountered and trialled real modifications to the environment. In this way it was possible to avoid any difficulties resulting from the lack of understanding of abstract concepts frequently exhibited by individuals with autism (Peeters, Gillberg & Peeters, 1999). Furthermore, this research received the support of school management to implement changes within the research classroom in order to identify elements that would enhance learning for the students. In addition, adopting a PAR approach for the present study provided an opportunity for the students in the research classroom to benefit from the classroom modifications throughout the course of the research process.

Another key feature of PAR which highlighted its suitability for the present study was that it is research whose purpose is to enable change. Elliott (1991, p. 69) defines PAR as "the study of a social situation with a view to improving the quality of action within it." According to Carr and Kemmis (1986, p. 186), PAR is "committed to not only understanding the world, but to changing it." These authors claim that "unlike interpretive researchers who aim to understand the significance of the past to the present, action researchers aim to transform the present to produce a different future" (Carr & Kemmis, 1986, p. 183). Furthermore Lewin (1946, p. 35) complained that "research which produces nothing but books will not suffice." These statements express very well the researcher's own sentiments, since the driving force behind this project was the fact that it provides an opportunity to link research with practice, with the transformational aim of improving learning for the students. Since the project findings would ultimately be used to inform the design of new classrooms at the research school, this project aimed to produce change by providing tangible benefits for all the students at the school. Furthermore, this research carried the potential to

instigate further change by being adapted to provide guidance and advice to other schools catering for students with profound autism.

A third essential feature of PAR for the present study was that it is a research process which progresses “in a spiral of steps, each of which is composed of planning, action and the evaluation of the result of action" (Kemmis & McTaggert, 1990, p. 8). This research process enables the knowledge obtained in previous cycles to influence and enhance subsequent cycles. In this step-by-step approach, insights gradually build up, enabling an understanding of complex situations. Since the students at the research school present such diverse and complex needs, and classrooms must be capable of catering for 3-6 students, this reflective cycle would seem essential to the successful development of an appropriate learning environment for these students. Consequently, the adoption of a PAR methodology in the present study reflected the intention that each modification to the environment would build upon and enhance prior modifications (Carr & Kemmis, 1986). The concept of the PAR spiral is illustrated below in Figure 6.1.

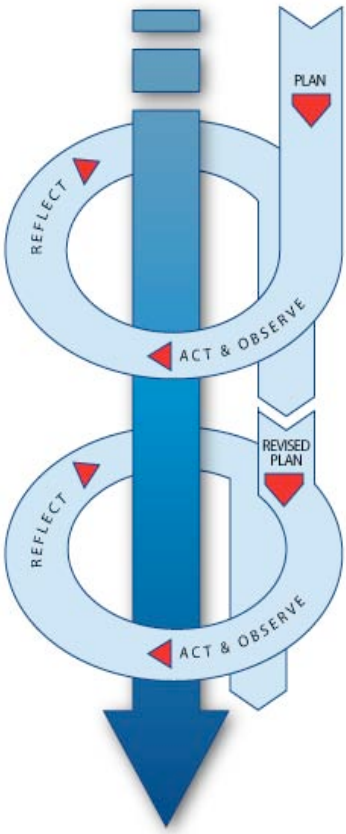


Figure 6.1: The PAR spiral (modified from Kemmis & McTaggert, 1990, p. 11)

A fourth important feature of PAR which is also key to distinguishing PAR from other research strategies is the importance of participant involvement in the research. PAR stresses a collaborative and participatory nature, with an emphasis on dialogue, such that 'all relevant parties' are actively involved in the research process (Denscombe, 2007). Bradbury and Reason (2001, p. 1) state that "it seeks to bring together action and research, theory and practice, in participation with others, in pursuit of practical solutions to issues of pressing concern to people." Thus collaboration is central to PAR, entails engagement of all those within the relevant community in the PAR process and necessitates a sharing of purpose and effort. The collaborative aspect of PAR was particularly essential for this research, since as highlighted in section 6.2, it was essential for this research to involve students, parents and practitioners in the co-construction of an evidence-base for the design of classrooms for the new school.

A final important element of PAR for the present research was that, as highlighted by O'Brien (2001):

> *"Action research is more of a holistic approach to problem-solving, rather than a single method for collecting and analyzing data. Thus, it allows for several different research tools to be used as the project is conducted. These various methods, which are generally common to the qualitative research paradigm, include: keeping a research journal, document collection and analysis, participant observation recordings, questionnaire surveys, structured and unstructured interviews, and case studies*."

This feature of PAR enabled it to be used as a meta-methodology (see Dick, 2002) within the present research, incorporating a variety of research methods through which students, parents and practitioners could be approached as co-constructors of the learning environment.

In overview, it was thus clear that whilst alternative methodological approaches such as a case study approach or an ethnographic study may equally have allowed in-depth research immersed in the natural setting of the research classroom (Robson, 2002; Yin, 2008), the collaborative and reflective qualities of PAR, combined with its focus on action and change, suggested that to be most effective in advocating the 'silent' voices of students with autism in order to develop a supportive learning environment for this complex population of students, PAR would be the most appropriate meta-methodological approach by which to carry out this enquiry.

Following the decision to employ a PAR approach, the researcher undertook an introductory period of immersion within the research site (more detail of which is

available in section 7.2.2). During this time, it gradually became apparent that due to the diverse and complex learning needs of the students at this school, it would be beneficial for the voices of not only the students in the research classroom, but all the students at the school to prevail to inform both the research findings and the subsequent design of the new school. However, it was clear from the outset that it would be unrealistic to attempt to employ the Mosaic approach, (which as discussed in section 6.2 advocates combining student observation, student consultation and consultation with parents and practitioners in order to access student voice), in its entirety for all the students at the school. Consequently, whilst the theoretical position underpinning the Mosaic approach remained integral to this research, for practical reasons the decision was made to extract one aspect of the Mosaic approach – the perspectives of practitioners – and extend this to incorporate all the practitioners working with all the students at the school.

This therefore necessitated that a suitable additional research strategy be identified. Reason and Bradbury (2001, p. xxiv) highlight that PAR describes "approaches to inquiry which are participative, grounded in experience, and action-oriented", and as discussed above, each of these qualities were considered to be crucial to the suitability of PAR within the present research. Consequently, in order to identify a research strategy through which to incorporate the additional population of practitioner participants alongside the PAR spiral, research methodologies which were similarly 'grounded in experience' and thus had the potential to effectively compliment the PAR study were explored through a review of possible strategies.

One approach identified which would support the researcher's purpose and fulfil the rich potential available was grounded theory. Grounded theory was initially developed by Glaser and Strauss (1967), and is a method for inductively deriving and emerging theory from data, rather than modifying pre-existing theories to fit the data (Strauss & Corbin, 1994). According to Dick, (2003, p. 2),

> *"On a superficial examination action research and grounded theory appear quite different … Grounded theory tends not to be participative. The action tends to be someone else's responsibility … A deeper exploration, however, reveals some important similarities. In particular, both are emergent - in both, the understanding and the research process are shaped incrementally through an iterative process. In both, data analysis and interpretation and theory building occur at the same time as data collection."*

Baskerville & Pries-Heje (1999, p. 5) reiterate this view, stating that “the grounded theory units of analysis are particularly well-suited for integration with action research … because they are suitable for holding data collection, analysis and theory formulation in a reciprocal relationship. This relationship harmonizes well with the action research cycle.” Consequently, grounded theory emerged as the method with the greatest potential to be effectively utilized alongside PAR in the present study.

In addition, Dick (2003, p. 10) goes on to suggest that combining PAR and grounded theory holds the potential to “use grounded theory as a theory development process within an action research cycle”, such that “action research can then be the meta-methodology … [for] a grounded theory study.” This view is also highlighted by Baskerville & Pries-Heje (1999, p. 2) who claim that “theory development is one area where action research methods can be made more powerful … merging some of the techniques of grounded theory (Glaser & Strauss, 1967) with the theory formulation steps in action research … [produces] a ‘theory-rigorous’ and powerfully improved action research method.” This process produces, in effect, ‘grounded action research’ (Baskerville & Pries-Heje, 1999; Simmons & Gregory, 2005). Morris (2000, p. 18) also claims that there are significant benefits to using a ‘grounded’ action research approach, describing it as:

> *"…a tool that allows a researcher to get at the essence of the core issues or problems. In this way the core issues generated … are the main issues of the participants because they generated them. This makes the 'action' generated by the research more likely to penetrate the nucleus of the problem and bring forth more lucrative solutions for all concerned."*

Another key feature of grounded theory which emphasised its suitability for use within the present study was that it stresses the importance of theoretical sensitivity. This relates to personal qualities of the researcher which enable them to relate to and understand the meaning and subtlety of the data, such that they are able to recognise important data and formulate conceptually dense theory. Theoretical sensitivity has been described by Glaser (1978) as the process of developing the insight with which a researcher comes to the research situation. Such insight usually involves the researcher working in the area to obtain experience and expertise. Theoretical sensitivity is particularly important for ensuring that the theory developed is grounded in the social reality of the situation being investigated (Scott & Usher, 1996). Within the present research, theoretical sensitivity was key, since a thorough understanding of the unique needs and abilities of students with autism was considered to be essential to

enable the researcher to employ effective data collection and analysis techniques. Futhermore, as an individual committed to the field of SEN, the researcher benefited from knowledge and experience gained from extensive hands-on work with students with autism and training in the field, both prior to commencing this research and throughout its duration. In addition, the researcher also undertook a period of induction and familiarisation with the research site as a whole, as well as with the students and staff involved in the project, prior to commencing the research, which served to further enhance theoretical sensitivity within the present research.

In overview, grounded theory is generally distinguished from other qualitative research approaches due to its focus on theory development, and emphasis on being emergent and conducting data collection, analysis, interpretation and theory development concurrently (Orlikowski, 1993; Trochim, 2006). Consequently, whilst alternative qualitative strategies such as a phenomenological approach may equally have allowed this research to explore and "understand a person's or persons' perspectives as he, she, or they experience and understand an event, relationship, program, emotion etc." (Hale & Astolfi, 2007, p. 207), the similarities between PAR and the grounded theory approach as reflective and grounded methodological approaches, and well as the potential for grounded theory to enhance theory development clearly emphasised the suitability of combining these two approaches within the present study.

6.5 Research Design: Mixed-Methods Designs

Many researchers now embrace the use of mixed-method research designs. According to Robson (2002, p. 164) "in principle, (and not uncommonly in practice), so-called qualitative designs can incorporate quantitative methods of data collection." In addition, Miles & Huberman (1994) emphasise that quantitative and qualitative methods can often be skilfully combined together. Furthermore, Johnson & Onwuegbuzie (2004, p. 24 & 18), claim that when mixed methods approaches are employed, one can "produce more complete knowledge necessary to inform theory and practice", and many research questions are "best and most fully answered." Denscome (2007, p. 132) further supports this view, outlining that "a far more profitable way to approach things … is to recognise that each method provides its own distinctive perspective … and these perspectives can be used by the researcher as a means of comparison and contrast."

Lindsay (2003) also advocates the use of mixed methods approaches in order to address a range of research questions surrounding inclusive education. Similarly, for the Primary Assessment, Curriculum and Experience project, classroom and assessment studies were conducted as well as surveys (Pollard, 1994). Moreover, Bergman (2008, p. 2) asserts that "for nearly a century researchers have successfully combined different types of data and analyses, without hitting the barrier which theoreticians had predicted – apparently mixed methods research works much better in practice than in theory." Thus, instead of continuing to polarise quantitative and qualitative methods, researchers have instead begun to use any research methods and techniques suitable in order to obtain and analyse data in the most relevant way.

Since both PAR and Grounded Theory are research strategies which may use a range of qualitative and quantitative methods (McNiff & Whitehead, 2006; Myers, 1997; Charmaz, 2000), this enabled a mixed-methods approach to be utilised in the present study. This was particularly suitable for the present research, since as highlighted in sections 6.2 and 6.4, in order to ascertain the views of the students at the research school it was considered important to involve students, parents and practitioners alike in the research process, thus necessitating a variety of research methods. The major challenge as researcher was then to decide which research methodologies would be most appropriate to produce relevant answers to the research aim, objectives and questions, an issue which will be discussed in greater depth in chapter 7.

6.6 PAR and the Role of the Researcher

Despite the arguments in favour of a PAR approach for the present study, it is important to acknowledge that PAR in education can be defined as research which is "a cyclical process undertaken by which teachers can participate in professional development in their own classroom" (Schollaert, 2000, p. 56). It thus seems essential at this stage to address the decision to undertake PAR in the present study, despite the fact that the research was lead by a non-practitioner researcher. While the emphasis of PAR is on group problem solving, the question of leadership and the distribution of roles, responsibilities, power and control within the group often arise. This presents a challenge for many proponents of PAR who tend to favour an egalitarian approach. However, there are those who maintain that some form of leadership or facilitation role by a lead researcher is necessary in order to generate and maintain the level of

momentum required for collaborative forms of enquiry such as PAR to be successful (Cassidy et al., 2008; Pedretti, 1996).

Pedretti (1996, p. 324) suggests that “any hegemony between academics and researchers dissolves, as each recognises the co-collaborative nature of the action research journey … 'researching' and 'facilitating' can coexist and complement one another.” In addition to this, collaboration between researcher and participant in PAR can be interpreted in different ways according to who undertakes the lead ‘researcher’ role and who are seen as the ‘participants’. In a study by Ditrano and Silverstein (2006), a researcher who was undertaking doctoral study successfully established a collaborative relationship with a group of parents in order to engage in a process of PAR aimed at developing better home-school links. In this case the distinction between researcher and participants became somewhat blurred, with all those involved acquiring the role of co-researcher, suggesting that PAR can be undertaken successfully even when it is researcher-led.

Furthermore, Denscombe (2007, p. 82) states that one disadvantage of PAR is that “action research tends to involve an extra burden of work for the practitioner.” Extensive demands are placed on teachers within special schools such as the school where this research takes place as a result of the high levels of differentiation and resources required for each individual student and lesson, as well as the 1:1 support required by the students throughout the school day. Furthermore, the anticipated demands of the current project with regards to data collection and research were high, and it was expected that these would require a researcher’s full-time attention in order to meet the time-limits imposed by the proposed new school build.

Consequently, for the purposes of the current research it was felt that burdening a teacher with the extensive additional demands of the present study would be unfair, and would ultimately be detrimental to the level of care and education received by the students. Due to the participatory nature of PAR, it was felt that the support of the classroom teacher and teaching assistants as co-researchers and collaborators would be sufficient to enable the successful progression of the research within a PAR framework. The decision made can be supported by considering the research project that was concurrently undertaken by the teacher in the research classroom for her own Master’s thesis. The demands of her job as teacher prevented her from undertaking

the labour-intensive methods of investigation utilised in the present study (Tillotson, 2008).

In addition to this, it is also necessary to consider the issues which may arise when a researcher (the outsider) undertakes research with participants (the insiders). According to Bartunek & Louis (1996, p. 1) "people who are insiders to a setting being studied, often have a view of the setting and any findings about it quite different from that of the outside researchers who are conducting the study." However, these authors go on to outline that such issues can be addressed through insider/outsider collaboration "in which members of the settings under study work together, as co-researchers, with outsiders. In this approach, insiders and outsiders jointly examine the setting … Together, they produce the sense made of the setting and the knowledge to be gleaned from it" (p. 3).

As an example of this type of research, the authors describe how "in the field of education, a grassroots movement of teachers is emerging in which teachers join with one another and an outside researcher to study their own practice systematically … At the heart of the teacher-researcher movement is an action research process" (p. 8). Since within this research a PAR approach was employed in which the researcher, teaching staff and students in the research classroom worked collaboratively as co-researchers to identify elements of a supportive learning environment for students with profound autism, this research addressed the issues associated with undertaking insider/outsider research through a process of ongoing insider/outsider collaboration. Furthermore, the process of insider/outsider collaboration can also offer distinct advantages by enabling the integration of diverse perspectives (Louis & Bartunek, 1992) and combining insider knowledge with outsider objectivity (Hurley, van Eyk & Baum, 2002).

6.7 Subjectivity and Reflexivity in Qualitative Research

Key to undertaking qualitative research is recognising that "the researcher's self plays a significant role in the production and interpretation of qualitative data" (Denscombe, 2007, p. 268). The researcher's identity, values and beliefs represent an integral part of the analytical process, and thus the resulting data and theory. In other words, "qualitative methodology recognizes that the subjectivity of the researcher is intimately involved in … [the] research. Subjectivity guides everything from the choice of topic

that one studies, to formulating hypotheses, to selecting methodologies, and interpreting data" (Ratner, 2002).

According to Denscombe (2007), the qualitative researcher has two contrasting ways in which to consider the influence of the self. One approach is to attempt to suspend their personal attitudes, prejudices and beliefs throughout the data collection and analysis process in order to minimise the impact of these on the research data. The alternative approach is to consider that their personal experiences and background enhance their insight into the situation being researched, thus allowing them to recognise and celebrate the role which their self plays in the data collection and analysis process.

Within the present study, the second approach was considered to be most appropriate, since a thorough understanding of the unique needs and abilities of students with autism was considered to be essential to enable the researcher to employ effective data collection and analysis techniques, as well as to ensure theoretical sensitivity. In the same way that thorough training and understanding of the needs of students with autism is considered essential for those working directly with students with autism (Plimley & Bowen, 2006), these were felt to be equally important qualities in a researcher attempting to identify the unique, diverse and complex educational requirements of students with profound autism. Consequently, the knowledge and experience held by the researcher gained from extensive hands-on work with students with autism and training in the field, both prior to commencing this research and throughout its duration, was considered to be a crucially important and integral part of the data collection and analysis process.

However, a key issue which arises once one recognizes the researcher's subjectivity, is how to take account of this within the research process in order to enhance the confirmability of the findings: that the findings are "reflective of and grounded in the participants' constructions" (Coleman, 2001). One perspective is that through acknowledging the researcher's subjectivity it is possible to reflect upon the researcher's beliefs, opinions and biases in order to enhance confirmability. Breuer, Mruck & Roth (2002) support this view, suggesting that since "doing qualitative research makes the impact of the researcher far more obvious … from this perspective, qualitative researchers … [need] to deal with this problem and to engage with it in a

reflexive way." Ratner (2002) reiterates this view, suggesting that "the researcher is encouraged to reflect on the values and objectives he brings to his research and how these affect the research project". Furthermore, according to Shacklock & Smyth, (1998, p. 7),

> *"For us, being reflexive in doing research is part of being honest and ethically mature in research practice that requires researchers to `stop being "shamans" of objectivity'. To not acknowledge the interests implicit in a critical agenda for the research, or to assume value-free positions of neutrality, is to assume `an obscene and dishonest position'".*

Based on these views, a process of reflexivity was employed to enhance the confirmability of the findings of the present research. The process through which reflexivity was fostered in this research will be described in more detail during chapter 8, and integrated within the results.

6.8 Issues of Trustworthiness in Qualitative Research

Establishing validity (that the research is actually measuring what it claims to measure, such that the data represents the reality and can be generalised) and reliability (that if the research were to be carried out on a similar group in similar circumstances, then similar results would be found) is an essential element of any research task, whether quantitative or qualitative (Patton, 2002). However, whilst "reliability and validity are treated separately in quantitative studies, these terms are not viewed separately in qualitative research. Instead, terminology that encompasses both, such as … trustworthiness is used" (Golafshani, 2003, p. 600).

In order to address the issue of trustworthiness for qualitative research, Strauss & Corbin (1990, p. 250) state that when judging qualitative work, the "usual canons of 'good science' require redefinition in order to fit the realities of qualitative research." Lincoln & Guba (1985) identify an alternative set of criteria that correspond to those typically employed to judge quantitative work (see Table 6.1), and which were chosen to be employed in the present study in order to address issues of trustworthiness.

Aspect	Positivist Term	Interpretivist Term
Truth Value	Internal Validity	Credibility
Applicability	External Validity/ Generalisability	Transferability
Consistency	Reliability	Dependability
Neutrality	Objectivity	Confirmability

Table 6.1: Positivist and Interpretivist terms appropriate to the four aspects of trustworthiness (adapted from Lincoln & Guba, 1985)

Credibility is having confidence and truth about the data and interpretations (Polit & Beck, 2009). Whilst the credibility in quantitative research depends on instrument construction, in qualitative research, “the researcher is the instrument" (Patton, 2002, p. 14). Consequently, credibility relies on the richness of the information gathered and the analytical abilities of the researcher, and can be enhanced through triangulation (Patton, 2002; Speziale & Carpenter, 2003). Since a mixed-strategy and mixed-method approach was employed in the present research, triangulation was utilised extensively within the current study, which served to enhance the richness and robustness of the findings and also ensure credibility.

Denzin (1978) identifies four basic types of triangulation:

1. Data triangulation
2. Methodological triangulation
3. Investigator triangulation
4. Theoretical triangulation

Data triangulation involves the use of a variety of data sources in a study, including primary (e.g. teachers and students) and secondary (e.g. textbooks, journals, relevant paperwork etc). As discussed, in the present study a number of different individuals were identified to be approached in order to inform the research findings, thus providing extensive data triangulation. Methodological triangulation involves the use of multiple research methods. As highlighted in section 6.5, the decision was made to adopt a mixed-methods approach for this research, and thus considerable methodological triangulation arose from both the use of different qualitative methods, and a combination of qualitative and quantitative methods.

Investigator triangulation is a useful way of reducing personal biases in data collection, analysis and interpretation, and meeting the dependability criteria. This type of triangulation takes a lot of extra effort and requires teamwork. Due to the participatory nature of the PAR approach adopted in the present study, all members of the team collected observational data, and regular team meetings were held to discuss the findings of the study, enabling investigator triangulation to be achieved in this way. Furthermore, a second observer was used on occasion to provide inter-observer

reliability. However, since the research was ultimately undertaken by a single researcher, it was not possible to utilise investigator triangulation in all aspects of the data analysis and interpretation. Finally, theoretical triangulation involves using multiple perspectives to interpret the data. Since in the present study grounded theory was utilised to infer theories from the multiple sources of evidence, theoretical triangulation was approached from the perspective of Glaser and Strauss (1967) who stated that it could be achieved by continually asking questions and making comparisons throughout the analysis process.

Transferability refers to the extent to which the study findings have meaning and are usable within similar situations. (Miles & Huberman, 1994; Polit & Beck, 2009; Speziale & Carpenter, 2003). In qualitative research, the transferability of findings to other situations depends on the degree of similarity between the original situation and the situation to which it is transferred. As such the transferability of findings is largely dependent on the sampling procedures utilised (Silverman, 2006), which will be described in detail in section 8.2. It is important for a qualitative researcher to provide sufficient information about the sampling process and the participants involved so that others can then use this to determine whether the findings are applicable to a new situation.

For the present study, two steps were taken in an attempt to ensure transferability of the findings. Firstly, as will be discussed later in greater detail (see section 8.2.1), students selected for participation in the study were chosen for being representative of the general population of students at this special school. Secondly, as discussed in section 6.4, a grounded theory study was undertaken to include other practitioners at the school within the research in an attempt to ensure that the views of all the students at the research school informed the research findings. In this way it was hoped that the findings would be transferable to meet the needs of the current and future students at this school. Additionally it was anticipated that in so doing the findings may have the potential to be transferable to assist other schools supporting students with profound autism.

Lincoln & Guba (1985, p. 316), state that “since there can be no validity without reliability (and thus no credibility without dependability), a demonstration of the former [validity] is sufficient to establish the latter [reliability].” This is a view reiterated by

Patton (2002) who identifies that reliability is a consequence of validity in a study. However, Silverman (2006) on the other hand, argues that reliability can and should be addressed in qualitative studies by

1. "making the research process transparent"
2. "paying attention to theoretical transparency" (Silverman, 2006, p. 282)
3. utilising low-inference descriptors: "recording observations in terms which are as concrete as possible" (Seale, 1999)

In an attempt to ensure dependability in the current study, research and data analysis methods and procedures will be described in detail, as will be the research findings and theory development. Furthermore, where possible, steps were taken to ensure inter-observer reliability.

Confirmability relates to the extent to which it is possible to confirm the accuracy, relevance, and meaning of the data collected, and thus is dependent upon the way the researcher documents and confirms the study findings (Speziale & Carpenter, 2003). To address this, data from the present study, as well as a detailed account of the data analysis process undertaken shall be provided in an attempt to prove confirmability of the current research. In addition, as discussed in section 6.7, confirmability also relates to the extent to which the findings reflect the true perspectives of the participants. To this end a process of reflexivity was employed to enhance confirmabilty within the present study.

6.9 Conclusion

In conclusion it can therefore be seen that the complex needs of the students at the research school influenced all aspects of the research approach, strategy and design for this study. In order to ensure that the views of the students effectively informed the research findings, the framework of the Mosaic approach was adopted, and students, parents and practitioners alike were considered crucial collaborators and co-constructors of knowledge in the research process. A qualitative 'grounded' PAR meta-methodology was implemented. PAR was selected in order to enable student behaviour to 'speak' where their words could not. A grounded theory study was incorporated to allow the views of the entire student population to inform the research findings through surveys with practitioners. A mixed methods approach to data

collection was adopted in order to ensure that suitable data collection techniques and tools could be utilised to include all these relevant parties within the research. Reflexivity was fostered in order to recognise the role of the researcher as a research instrument and enhance confirmabilty.

CHAPTER 7
MEASUREMENT TECHNIQUES, TOOLS & RELATED ISSUES

7.0 Overview

As discussed in chapter 6, 'grounded' PAR and a mixed methods approach were considered to be the most suitable methodological approaches by which to research the development of an optimal learning environment for students with ASDs in order to ensure that the students' views effectively informed the research findings through including students, practitioners and parents alike in the data collection process. Consequently many different methodological techniques were employed and this chapter shall now provide an overview of the specific research methods and data collection tools employed in the present study.

7.1 Measurement Techniques and Tools

In order to fulfil the aims and objectives of this research and answer the research questions (see section 6.1), the framework of the Mosaic approach (see section 6.2) was adopted, and a variety of different research methods and tools were utilised to enable students, parents and an array of practitioners to co-construct an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs. Table 7.1 shows the range of research methods and tools used, their purposes, the sample, frequency, and the persons responsible for generating the data.

Data Collection Method	Purpose	Undertaken By	Sample	Frequency
Classroom Observations	Build an evidence-base of necessary modifications to the learning environment	Researcher and Class Team	Students and staff in Research Classroom	Multiple
Photographic / Video Evidence	Document changes through visual evidence to support written observations	Researcher and Class Team	Modifications implemented and students in the research classroom	Multiple
Engagement Scales	Assess the suitability of trialled modifications	Researcher	Students in Research Classroom	Multiple
Engagement Scale Inter-Observer Reliability	Test credibility of scales	Researcher and School Research Assistant	Students in another class at the research school	5
Interviews	Obtain teachers perspectives regarding learning environments for their students	Researcher	Research School Teachers	15
Questionnaires	Obtain other staff's perceptions regarding an optimal learning environment	Researcher	Research school TAs, Care staff, Psychology and Therapies, SAOS, Parents of students in research classroom	28 completed responses received
Follow-Up Interviews with Questionnaire Respondents	Explore interesting responses in greater detail	Researcher	Selection of Questionnaire Respondents	4
Learning Environment Team Meetings	Provide an opportunity for regular discussion and feedback within the PAR team	PAR Team	Research School Learning Environments Research Team[2]	13
1:1 Meetings with Teachers	Obtain teacher's impressions of the new furniture	Class Teacher	Research school Teachers	10

[2] Research School Chief Executive; Research School Head of Education; Research School Research and Development Officer; Research School Publications Manager and Research Fellow; Research Classroom Class Teacher; Research Classroom Senior Teaching Assistant; Research Classroom Teaching Assistants

Data Collection Method	Purpose	Undertaken By	Sample	Frequency
Sensory Profiles	Ensure the students' sensory difficulties inform the research	Occupational Therapist	Students in the research classroom	4
Student Voice – Talking Mats and Cameras	Provide the students with an opportunity to express their views about the modifications trialled	Researcher planned activities, Class teacher and TAs presented them to students.	Students in Research Classroom	6

Table 7.1: The range of research methods and instruments used

7.2 Classroom Observations

The decision to utilise observation stemmed, as highlighted in section 6.2, from the nature of the students involved in the research and the subsequent decision to utilise the principles of the Mosaic approach to assist in obtaining students' voices. The Mosaic approach emphasises the importance of incorporating student observation to build an evidence-base from which to inform practice, since it "provides one way of making children's lives more visible" (Clark & Moss, 2001, p. 13). In addition to this, other factors relating to observation as a research technique also lend further support for the suitability of this approach in the current study.

Cohen et al. (2000, p. 206) highlight that "observation studies are superior to experiments and surveys when data are being collected on non-verbal behaviour." Denscombe (2007, p. 192) also supports this argument, claiming that observation "does not rely on what people say they do, or what they say they think. It is based on the premise that, for certain purposes, it is best to observe what actually happens." Similarly, Robson (2002, p. 309) identifies that "the actions and behaviour of people are central aspects in virtually any enquiry." In addition, Patton (1990) emphasises that observation affords the researcher the opportunity to collect evidence first-hand through witnessing actual events. Observation therefore seemed an ideal methodology by which to inform the development of an optimal learning environment for students with profound autism, since it afforded the opportunity for the students' behaviour, engagement and actions within their learning environment to 'speak' where their words could not.

Moreover, Morrison (1993) argues that observation enables the researcher to collect data on four broad aspects of a situation:

1. the physical setting (i.e. the physical environment)
2. the human setting (i.e. the people in the environment)
3. the interactional setting (i.e the interactions taking place, both person-person and person-environment)
4. the programme setting (i.e. resources, pedagogic styles etc)

Since these four aspects paralleled the elements of the learning environment identified through the literature review as being important aspects to explore for the present research – the physical environment, the people in the environment, and the teaching pedagogy and related resources – this served to reinforce the suitability of observation as a methodology for this research.

7.2.1 Types of Observations

Observations lie on a continuum from structured to unstructured (Cohen et al., 2000). Denscombe (2007) highlights two main strands of observation research, both of which play an important role in the current study. The first is participant observation which has its roots in social and cultural anthropology. This involves the integration of the researcher into the group being researched, in order to develop an understanding of the culture and processes of the group being researched from within. It produces unstructured observations, and is usually associated with the collection of qualitative data (Schein, 2001). The second type of observation is systematic observation, also known as structured observation. This has its origins in the study of classroom-based interactions. Systematic observation is usually associated with the collection of numerical quantitative data, which facilitates comparisons between data sets, enabling frequencies, patterns or trends to be easily identified (Schein, 2001).

Although these two methods appear to differ significantly from one another, Denscombe (2007) highlights a number of shared core characteristics which make both techniques particularly suited to the present study:

1. Direct observation – both allow the researcher to collect data first-hand
2. Fieldwork – both require the researcher to collect data in real-life situations

3. Natural settings – both allow the researcher to collect data from naturally occurring situations, rather than artificially created conditions
4. The issue of perception – both methods of observation acknowledge that the researcher's viewpoint may bias observations, and recognise that this needs to be addressed

7.2.2 Observations in the Present Study

For the present study, both participant (unstructured) and systematic (structured) observations formed significant parts of the research process. The decision to utilise both styles of observation within the present study arose from both the nature of the students involved in the project, and the aims of the project. Participant observation was adopted as a research method for two main reasons. Firstly, the unstructured observations characteristic of participant observation lend themselves to hypothesis-generating data, since undertaking participant observation enables the researcher to make free fieldnotes of any student or staff behaviours or comments which the researcher or classroom staff consider to hold potential relevance to the research. In addition, as Johnson (2006, p. 128) states "once you start recording, you begin to see things that are interesting or important. In this way field notes help you notice details you might not otherwise have noticed."

Nevertheless, a conscientious effort is required to be sensitive not only to what happens, but also to what does not happen. As Mertens (1998, p. 320) puts it, "when your basic experience with a program suggests that the absence of some particular activity or factor is noteworthy, be sure to note what did not happen." Since the aim of this research was to build an evidence-base from which to develop an optimal learning environment for students with ASDs, at the outset of the project it was unknown what would be significant, and thus the data needed to allow for the emergence of key issues through grounded theory, providing a hypothesis rather than proving one, an opportunity afforded by unstructured participant observation.

Nevertheless, unstructured observations also lie on a continuum from complete participant observation to complete observer (non-participant) (Cohen et al., 2000). The reason for undertaking participant rather than non-participant observation related to the needs of the students, since many individuals with ASDs experience anxiety when presented with unknown individuals or environments (Groden, Cautela, Prince &

Berryman, 1994; Howlin, 1998; Jordan, 1999). As such, it was essential for the present researcher to spend a period of time, in the case of this research approximately 2 months, integrating with the students in the classroom.

This period of integration allowed the students to become familiar with the presence of the researcher, thus eliminating any anxiety or stress which may have influenced the data collection process. This period of time also allowed for the reduction of more subtle reactivity effects (the effects of the researcher on the researched) for both the students and the staff within the research classroom. Additionally, this period of immersion was essential in enabling the researcher to develop a thorough understanding of the individual students involved in the project, their behaviour patterns and needs, such that the researcher would be in a position to notice subtle changes in behaviour which could be indicative of problems within the environment. This was supported by previous research with students with ASDs which highlighted that "it was important that those carrying out the consultations had prior knowledge of the children. This was vital in terms of:

- "putting them at ease and minimising social discomfort
- interpreting their affect and disposition and
- understanding their communication" (Preece, 2002, p. 102)

The decision to also utilise systematic observation alongside participant observation, evolved from the decision to utilise engagement as a key indicator of learning within the present study (see chapter 4). As discussed, engagement is recognised as a crucial mediating factor between the environment and effective learning for students with disabilities. Since it is standard practice to measure engagement through engagement scales, as illustrated by the volume of scales currently in existence for assessing the engagement in learning of a variety of different populations of students (see section 4.3), it seemed logical to utilise an engagement scale, and thus systematic observations, to undertake this aspect of the research.

However, since as highlighted in chapter 4, none of the available existing engagement scales were considered to be suitable for assessing the engagement of this group of students with profound autism, an alternative was required. The subsequent

development of an engagement scale sensitive to the unique learning profiles of this group of students will be discussed in section 7.6.

7.3 Sensory Profiles

Developed by Dr. Winnie Dunn, sensory profiles can help understand a child's sensory processing patterns. These unique instruments offer a research-based approach to assessing sensory processing to assist in intervention planning. As described in sections 3.2.3 and 3.2.4, it is well documented that individuals with autism exhibit an array of sensory processing and regulatory difficulties (Baranek, 2002; Bogdashina, 2003), and these may have a considerable impact on what constitutes a suitable educational environment for these students (Shabha, 2004). Consequently, the students' sensory profiles were considered to be a crucial tool in the data collection process.

Sensory profiles can be utilised to:

- "Understand the complexities of students' sensory processing
- Gather critical sensory information related to home, school, and work
- Design strategies for managing daily life" (Dunn, 2008a)

7.4 Interviews

The research interview has been defined as a "guided conversation whose goal is to illicit from the interviewee rich, detailed materials which can be used in data analysis" (Lofland & Lofland, 1995, p. 18). It is precisely the direct interaction characteristic of the interview which is the source of both its advantages and disadvantages as a research technique (Frechtling & Sharp, 1997). For example, one fundamental advantage of the interview is that it provides an opportunity to research an issue in far greater depth than would be possible with other methods of data collection such as questionnaires. However, this carries with it the disadvantage that the interview will be affected by bias from the interviewer (Frechtling & Sharp, 1997).

According to Denscombe (2007, pp. 164-165), it is appropriate to utilise interviews when the research:

- requires "detailed information"

- when it is “reasonable to rely on information gathered from a small number of informants”, and
- when the data is based on “emotions, experiences and feelings”, “sensitive issues” or “privileged information”

As discussed in section 6.4, this research aimed to gain a detailed awareness of the needs of all the students at the school through obtaining the views of the practitioners working with them. It was thus decided that interviews with each of the fifteen teachers at the school would be crucial to enable the researcher to gain a sufficiently detailed insight into the needs of all the students currently attending this school, since it was anticipated that each of the teacher’s perspectives would provide a unique insight into the needs of the students in their class.

For these reasons, the criteria for undertaking interviews were easily justified. Furthermore, due to the favourable framework within which the study was conducted, the researcher was also able to meet the feasibility criteria outlined by Denscome (2007, p. 165), with guaranteed:

- “direct access to the prospective interviewees” and
- Viability “in terms of the costs in time and travel involved”

7.4.1 Types of Interviews

To date, an abundance of different types of interviews have been defined by researchers, and the number of types described tends to vary depending on the source one reads. For example, Patton (1990) outlines four types of interviews, whilst LeCompte, Preissle & Tesch (1993) provide six types. It can consequently be difficult if not impossible for the researcher to identify a particular suitable interview approach. Rather than specify particular interview types, Kvale (1996) chooses to conceptualise interviews in terms of five key qualities which he claims lie on a spectrum, such that any particular type of interview holds a particular position somewhere on each spectrum. These five key qualities are:

1. “structure, from well organised interviews… to open interviews”
2. “openness of purpose”
3. “emphasis on exploration versus hypothesis testing”

4. “description versus interpretation” seeking
5. intellectual-emotional dimension (Kvale, 1996, pp. 126-127)

For the present study, it was immediately clear that the teachers would be aware of the purpose of the study and thus the interview, and that the emphasis would be on exploration since the intention was to use grounded theory to analyse the results. No specific stance was chosen for the last two criteria, since this would depend on the course of the interview, although it was anticipated that the interviews would produce largely descriptive and intellectual responses. The final remaining criterion thus requiring consideration was that of the interview structure. Cousin (2009), outlines three structural alternatives: structured, semi-structured and unstructured. “Structured interviews are essentially face-to-face surveys where mainly closed questions are asked” (Cousin, 2009, p. 71). Although such interviews provide for easily analysable results, the absence of freedom of response arising from the need for predefined answers precluded its use in the present study.

In contrast to the structured interview, semi-structured and unstructured interviews both allow interviewees to formulate their own answers and develop their own thoughts, and thus both provide far richer sources of data and held greater relevance for use in the present research. “Unstructured interviews are where the researcher guides naturally occurring conversations … semi-structured interviews are so-called because the interview is structured around a set of themes which serve as a guide to facilitate interview talk” (Cousin, 2009, p. 71). Of the semi-structured interview, Denscombe (2007, p. 167) says

> *“the interviewer still has a clear list of issues to be addressed and questions to be answered. However…the interviewer is prepared to be flexible in terms of the order in which the topics are considered, and,…to let the interviewee develop ideas and speak more widely on the issues raised.”*

A major difference between semi-structured and unstructured interviews relates to the extent to which it is possible to analyse and compare results (Cohen, Manion & Morrisson, 2000). For unstructured interviews, it is often the case that different information arises from the different interviews, leading to less systematic and comprehensive data, and resultant data organisation and analysis difficulties. For semi-structured interviews, since questions are determined in advance, similar topics are covered, and thus organisation and analysis of data is simpler (Patton, 1990). Consequently, in order to ensure that the teacher interviews would provide analysable

and comparable results, a semi-structured interview approach was chosen, and an interview schedule was developed.

Another way in which interviews differ relates to how they are undertaken. One of three main approaches is usually employed: the one-to-one interview between interviewer and interviewee, the group interview where one interviewer interviews a group of around 4-6 informants, and the focus group, usually employed for larger groups of 6-9 people. A major disadvantage of all types of group interviews is the possibility that interviewees will be reluctant to reveal information or opinions on certain matters in front of others, and that certain characters may dominate the interview, either preventing others from speaking or influencing the views they express (Berg, 2007; Hatch, 2002). Since the purpose of the teacher interviews in this research was to gain an insight into the needs of all the students at the school, it was considered important for every teacher to have an opportunity to consider the questions specifically in relation to the individual students in their class. Consequently, one-to-one interviews were considered to be the most appropriate technique for this study.

7.4.2 The Interview Investigation

Kvale (1996) sets out seven stages which can be used to plan an interview investigation, and which were utilised in the present study. These seven stages are outlined in Table 7.2.

Stage	Definition
Thematising	Formulate the purpose of an investigation and describe the concept of the topic to be investigated before the interviews start.
Designing	Plan the design of the study, taking into consideration all seven stages of the investigation, before the interviewing starts.
Interviewing	Conduct the interviews based on an interview guide and with a reflective approach to the knowledge sought and the interpersonal relation of the interview situation.
Transcribing	Prepare the interview material for analysis, which commonly includes a transcription from oral speech to written text.
Analysing	Decide, on the basis of the purpose and topic of the investigation, and on the nature of the interview material, which methods of analysis are appropriate for the interviews.
Verifying	Ascertain the generalisability and trustworthiness of findings.
Reporting	Communicate the findings of the study and the methods applied in a form which lives up to scientific criteria, takes the ethical aspects of the investigation into consideration, and that results in a readable product.

Table 7.2: The 7 stages of an interview investigation (adapted from Kvale, 1996, p. 88)

7.4.3 The Interview Investigation in the Present Study

Thematising

The main aim of the interviews was to gain an insight into the needs of all the students at the school through exploring the teachers' perceptions regarding the suitability of the current classroom learning environments, and their aspirations for the design of classrooms in the new school. Based on the literature review, it was anticipated that the interviews would focus on obtaining the teachers' perceptions regarding three main aspects of the learning environment: the physical environment, the teaching pedagogy and resources, and the staff and students in the environment. Due to the increasing emphasis on engagement through the course of the project, as the interview schedule was developed and revised the additional theme of 'engagement in learning' was incorporated into the interview, in order to obtain the teachers' perspectives on the relationship between engagement and learning for their students.

Designing

According to Kerlinger (1970), when designing interviews one has a choice of three main question formats:

1. Fixed-alternative – these allow the respondent to choose their answer from pre-determined options
2. Open-ended – these allow respondents to provide unconstrained answers
3. Scales – these allow the respondent to indicate the extent to which they agree with a selection of statements

Whilst fixed-alternatives and scales provide uniform responses which can be easily analysed and compared, thus ensuring a high level of reliability, open-ended questions allow far greater probing of the issue being investigated, enabling the respondents' true opinions on a topic to be revealed, and ensuring that unanticipated answers are not missed through the use of pre-dictated answers (Sharma, Sharma & Pathak, 2006). Furthermore, since the aim was to analyse the results through grounded theory, and thus at this stage possible resolutions to the research question had not been hypothesised, it was considered that utilising fixed-alternative or scale questions would not be appropriate. For these reasons, the decision was made to employ open-ended questions within this research in order to ensure that respondents were free to reveal their own experiences and opinions.

Based on these decisions, a semi-structured interview schedule containing open-ended questions was developed. When writing questions to be utilised in either an interview or questionnaire, Denscombe (2007) highlights a number of issues which require consideration. In particular, Sharma et al. (2006, p. 135) summarise that "the wording of questions should be free from ambiguity … care should be exercised questions do not promote insincere socially desirable responses … leading questions should also be avoided." In order to ensure that these wide-ranging issues were addressed, a process of continual revision and amendment was employed in order to produce the final interview schedule. In addition, the interview schedule was piloted with the teacher and teaching assistants in the research classroom, since these staff had the opportunity to directly contribute to the research through the PAR spiral, and thus they were not included in the interview process. The final interview schedule is shown in Appendix 2.

Interviewing

All the teachers working at the school involved in this research were invited for interview in order to ensure that the research findings incorporated the needs of all 66 students at the school. Interviews were conducted using the final interview schedule shown in Appendix 2. Interviews took place within a private setting chosen by the interviewee to ensure respondents felt comfortable within their environment. In addition, a selection of basic factual questions such as 'how many students are in your class?' were utilised at the beginning of the interview, since Denscombe (2007, pp. 154-155) highlights that "the researcher should be sure that the most straightforward questions come at the start … the ordering of questions can … entice or deter the respondent from continuing."

Transcribing

Interviews were recorded using a digital voice recorder, since as highlighted by Denscombe (2007, p. 175), "the human memory is rather unreliable as a research instrument … audio tape-recording offers a permanent record and one that is complete in terms of the speech that occurs." Anderson and Arsenault (1998, p. 187) suggest that it is important to acknowledge that "a microphone in the middle of the table can put some interviewees on edge and affect their responses." However, the benefits gained with regards to the accuracy and detail of the data (Wellington, 2000) were considered to outweigh this disadvantage. The sound files were then transferred on to a computer and used to transcribe the interviews into written text. Whilst transcription is certainly

laborious and time-consuming, this process was considered essential since it has been shown to “bring the researcher close to the data” and “provide the researcher with a form of data that is far easier to analyse” (Denscombe, 2007, p. 183), thus enhancing the quality of data analysis.

Analysing

In line with the undertaking of a grounded theory study, the transcribed interviews were analysed through grounded analysis in order to identify emerging themes and enable the data to directly shape the findings.

7.5 Questionnaires

Questionnaires come in many shapes and sizes, however in order to qualify as a questionnaire fit for the purposes of research, Denscome (2007) outlines that it must:

- “be designed to collect information which can be used subsequently as data for analysis …
- consist of a written list of questions …
- gather information by asking people directly” (Denscombe, 2007, pp. 144-145)

Whilst this may seem overly simplistic, it is precisely these characteristics which make the data obtained from questionnaires distinct from that acquired through interview. Shelton (2000, p. 150) states that “there are basically three types of data gathered when using questionnaires – fact, opinion, and motive.” Factual information, necessitates only the reporting of facts, and should typically be easy for the respondent to answer. Opinions on the other hand require judgements influenced by attitudes, views, beliefs and preferences. Finally motive relates to why the respondent believes what they do. Motive questions are generally the most diverse and difficult to analyse. Based on this, the decision was made to utilise a combination of factual and opinion questions in the present study.

According to Denscombe (2007), questionnaires are most suitable when:

- “used with large numbers of respondents
- what is required tends to be fairly straightforward information
- the social climate is open
- there is a need for standardised data
- time allows for delays
- resources allows for costs
- the respondents can be expected to be able to read and understand the questions” (Denscombe, 2007, p. 145)

As discussed in section 6.2, the framework of the Mosaic approach was employed in order to ensure that the students’ views effectively informed the research findings. One aspect of this is to incorporate parents’ perspectives. Since the research school was residential, the decision was made to incorporate the parents’ views within the grounded theory study through postal questionnaires. In addition, as discussed in section 6.4, it was also determined that the most feasible way to incorporate the views of all the students at the school within the research would be to obtain the practitioners’ perspectives. With regards to teachers, as discussed in section 7.4 it was possible to undertake interviews with this small group of practitioners to obtain their views.

However, as previously highlighted, an array of other professionals work with the students at the research school, including carers, teaching assistants, psychologists, therapists and outreach staff. As theoretical sampling progressed (the process of which is discussed in detail in section 8.2.2), it became clear that it was important to invite these individuals to participate within the grounded theory study. However, since this amounted to almost a hundred individuals, it was immediately clear that in this situation interviews would not be feasible. The decision was thus made to utilise questionnaires to obtain the perceptions of this wide selection of staff, with follow-up interviews to be conducted to consolidate responses as and when necessary.

Due to the favourable circumstances within which this research was taking place, it was possible to meet the other feasibility criteria outlined by Denscombe (2007), namely that costs were not considered to be an issue, the respondents were considered to be able to read and understand the questions, and it was felt that

sufficient time would be available to enable the questionnaires to be re-sent a number of times in order to maximise the response rate. It was also anticipated that due to the extensive support for this research received from management at the school, the social climate would be sufficiently open to enable the respondents to provide full and honest answers.

However, there was nevertheless a degree of concern that since many of the questions were anticipated to require opinions which may be controversial, respondents may be overly cautious and positive in their answers due to a reluctance to criticise the school 'in writing'. For these reasons, the decision was therefore made to undertake a small number of follow-up interviews to enable respondents' answers to be explored in greater detail and depth. Indeed it has been observed that "where the questionnaire might have thrown up some interesting lines of enquiry, researchers can use interviews to pursue these in greater detail and depth. The interview data complement the questionnaire data" (Denscombe, 2007, p. 166).

7.5.1 Types of Questionnaires

As with interviews, there are many different types of questionnaires which a researcher may employ, and there are many different ways in which questions can be framed, both of which can crucially influence the responses received (Cohen et al., 2000). In addition, questionnaires, like interviews, can be broadly divided into unstructured, semi-structured and structured. Nevertheless, according to Cohen et al. (2000, pp. 247-248)

> *"the larger the size of the sample, the more structured, closed and numerical the questionnaire may have to be, and the smaller the size of the sample, the less structured, more open and word-based the questionnaire may be … if a site-specific case study is required, the qualitative, less structured, word-based and open-ended questionnaires may be more appropriate as they can capture the specificity of a particular situation."*

Since within the present study a total of 96 individuals were identified to be approached through the questionnaire, and it was known that all respondents (except the 6 parents) would be from within the school, it was considered that a semi-structured questionnaire would be most appropriate in order to obtain the opinions of this group of individuals. In addition, the decision was made to employ the same schedule of questions utilised for the teacher interviews. In this way it was anticipated that it would be easier to analyse and compare results.

7.5.2 The Questionnaire Investigation in the Present Study

Since the interview schedule was utilised as the questionnaire schedule, it was not necessary to undertake the process of questionnaire design from scratch. In addition, the initial interviews were assessed in place of piloting the questionnaires. Based on the initial interviews, the wording of one question within the interview was minorly amended for use in the questionnaires since it was found to produce numerous interpretations which the researcher had not anticipated. Minor amendments were also made to the wording of all the questions according to whether the targeted audience was the teaching assistants, carers, other professionals or parents, to ensure that the "style of questions is suited to the target group" (Denscombe, 2007, p. 153). In addition, an information sheet was collated to support questionnaire respondents to answer the questionnaire independently, since interview respondents were found to require definitions for certain terminology integral to the project such as the definitions of 'engagement' and 'learning environment'. Copies of the questionnaires utilised, the consent form and the information sheet can be found in Appendices 3.1-3.4, 1.2 & 1.3 respectively.

7.6 Engagement Scales

The conceptual framework for this study is that engagement mediates the effects of the learning environment on learning, and thus that engagement can be used as an indicator of the quality of the learning environment. As outlined in chapter 4, the association between learning environment quality and engagement is one which has long been established, thus setting the stage for the purpose of the present research – to build an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs.

In order to corroborate the crucial importance of student engagement for learning as highlighted by the literature review (see chapter 4) and classroom observations, the interviews and questionnaires discussed above were utilised to obtain the staff's perceptions regarding the relationship between student engagement and learning. Within their discussions on engagement, staff highlighted that *engagement is essential for learning (34)*[3] and that there are a variety of *indicators of engagement (40)* which they use to identify when a student is engaged in learning. Consequently this provided

[3] These italicised phrases relate to focused codes identified through the grounded analysis. Please see section 8.11.3 for further explanation.

sound support for both the importance of engagement for learning, and the idea that students' engagement in learning can be assessed through observing their 'learning behaviour' in order to complete engagement scales.

The engagement scales developed for use in this study were based upon a selection of scales which were reviewed in detail in section 4.2. The key scales from which the ones devised for this study were drawn are: the Individual Child Engagement Record (ICER) (Kishida & Kemp, 2006a; Kishida & Kemp, 2006b), the Sherborne Developmental Movement Engagement Scale (Konaka, 2007c), the Interaction and Engagement Scale (IES) (Hunt et al., 2002; Hunt et al., 2004), the ICER – Revised (ICER-R) (Kishida & Kemp, 2009; Kishida et al., 2008), the Engagement Check II (McWilliam, 1999) and the Engagement Quality Observation System III (E-Qual III) (McWilliam & de Kruif, 1998). Table 7.3 outlines the various qualities of these scales, highlighting in bold those which were selected to be particularly important for inclusion in the scales developed for the present study.

Scale Name	Authors and year	Observation type	Observation Method	Records levels of engagement	Records focus / type of engagement	Population scale is devised for	Measures individual or group engagement?	Requires extensive training or equipment	Space for qualitative comments
EQUAL-III	McWilliam & de Kruif (1998)	**Direct observation**	**Momentary time sampling, 15s intervals**	Yes – 9 levels persistent through to non-engaged	**Yes – 4 types: Peers, adults, objects, self**	Early Years	**Individual**	Yes	No
Engagement Check II	McWilliam (1999)	**Direct observation**	**Momentary time sampling, 15s intervals**	No – only dichotomous engaged vs non-engaged	No	Early Years	**Group**	**No**	No
IES	Hunt et al. (2002)	**Direct observation**	Partial interval recording, 30s intervals	Yes – 3 levels active, passive & non-engaged	No	Children with and without disabilities	**Individual**	**No**	No
ICER	Kishida & Kemp (2006)	**Direct observation**	**Momentary time sampling, 15s intervals**	**Yes – 5 levels active, passive,** undifferentiated, **active & passive non engagement**	No	Children with disabilities	**Individual**	**No**	No
SDM Engagement Scale	Konaka (2007)	**Direct observation**	Task-specific observation of SDM movements	**Yes – 5 levels** Refusal, retreatism, **ritualistic engagement**, passive engagement, **authentic engagement**	No	Children with autism	**Individual**	**No**	**Yes**
ICER-R	Kishida, Kemp & Carter (2008)	**Direct observation**	**Momentary time sampling, 15s intervals**	Yes – 4 levels **Active, passive, active & passive non engagement**	No	Children with disabilities	**Individual**	**No**	**Yes**

Table 7.3: Overview of the existing scales utilised to inform the development of novel scales for the present study.

The aspects extracted for the design of the scales for this project were:

- Direct observation
- Momentary time sampling (30s or 15s)
- 5 levels of engagement
- 2 focuses of engagement (people or objects)
- Sensitive to the learning profiles of students with autism
- Measures individual engagement
- Measures group engagement
- Does not require extensive training or equipment
- Has space for qualitative comments

Table 7.4 below provides further insight into those elements of the existing scales which were extracted to inform the design of the novel scales created through this research.

	Existing Scale					
Scale characteristic selected to inform the design of scales for the present study	**EQUAL-III**	**EC II**	**IES**	**ICER**	**SDMES**	**ICER-R**
Direct Observation	✓	✓	✓	✓	✓	✓
Momentary time sampling	✓	✓		✓		✓
5 Levels of engagement				✓	✓	
2 focuses of engagement	✓					
Sensitive to the learning profiles of students with autism					✓	
Measures individual engagement	✓		✓	✓	✓	✓
Measures group engagement		✓				
Does not require extensive training or equipment		✓	✓	✓	✓	✓
Has space for qualitative comments					✓	✓

Table 7.4 Characteristics of existing scales incorporated within the novel scales designed within the present study.

Based on these criteria, four different direct observation engagement scales were initially developed for each of four classroom activities (group work, 1:1 work, independent work and choice time) which were observed to occur frequently within the research classroom, in an attempt to ensure that the data accurately reflected the students' engagement in the activity being assessed. The group work and choice time scales were devised to measure group engagement, since these were activities that all students were engaged in simultaneously, and thus to be most informative the scales needed to assess the extent to which all students were engaged in the activity. In contrast, the 1:1 work and independent work scales were devised to measure individual student engagement since for these activities students worked individually, and thus it was considered to be more important to have a detailed assessment of each students' engagement in their activity. All the scales were direct observation tools and utilised momentary time sampling since it "has consistently been shown to provide more accurate estimates of duration than "partial" or "whole" interval recording" (Bramlett & Barnett, 1993, p. 7).

As discussed in section 4.1, the importance of measuring the level of engagement for students with disabilities such as autism has frequently been documented (Keen, 2009; Ruble & Robson, 2007), and thus all the engagement scales developed in this study distinguished between different levels of engagement. Five levels of engagement were selected for each of the three types of teacher-planned activities: (i) independent work, (ii) 1:1 work and (iii) group work. These were:

- active authentic engagement
- passive authentic engagement
- ritualistic engagement
- passive non-engagement
- active non-engagement

As illustrated in Table 7.3 above, these 5 levels of engagement represent a combination of those used in the ICER and the SDM engagement scales in order to develop a scale sensitive to the learning profiles of students with autism. The levels of 'ritualistic' engagement and 'authentic' engagement were extracted from the SDM scale. These were selected to enhance sensitivity to the learning profiles of students with autism, since the students were frequently observed to be engaged in

stereotypical or repetitive behaviour which was not meaningful to the learning activity. Consequently it was anticipated that it would be important to distinguish between engagement in stereotypical behaviour – coded ritualistic engagement – and meaningful engagement in the learning activity – coded authentic engagement. However, the codes of refusal and retreatism were considered to be too specifically applicable to an SDM session where students frequently retreated from the session or refused to participate, situations which were rarely observed within the classroom setting. Consequently, it was anticipated that these would not transfer appropriately to the classroom activities which were the focus of the present research. Instead, the more general levels of active and passive non-engagement utilised in the ICER and ICER-R were combined with the levels of ritualistic engagement and authentic engagement utilised in the SDM engagement scale. This produced the 5 levels of engagement outlined above which formed the backbone of the novel scales used in the present study.

In addition, based on the ICER, the scale for 1:1 work also included space to record the use of prompts by the staff to engage the student, in order to determine the degree of spontaneity of engagement. Furthermore, the two group engagement scales (for group work and choice time) included an additional code for when a child was out of sight, for example if they had left the classroom to visit the bathroom.

For the one child-initiated activity, choice time, the decision was made to place a slightly different focus on this engagement scale. The literature review in chapters 3, 4 and 5 highlighted the importance of facilitating the social engagement of students with autism. Consequently, it was anticipated that it would useful for the choice time scale to be able to establish the degree of social engagement occurring within the classroom during choice time, (either between peers or between students and staff). Consequently the decision was made to utilise a condensed form of the focuses utilised in the EQUAL-III (peers, adults, objects and self) in order to enable this scale to be sensitive to whether the students were socially engaged or engaged with materials. As a result, this scale was designed to distinguish between 3 levels of engagement (authentically engaged, ritualistically engaged and non-engaged) and 2 focuses of authentic engagement (engaged with a person, and engaged with materials).

Definitions and examples for each of the 5 levels of engagement and the 2 focuses of engagement can be found in Tables 7.5 and 7.6.

Level of Engagement	Definition	Examples
Active Authentic Engagement	Student actively participates in the activity by interacting with the learning environment appropriately, by manipulating materials or vocalising. The student does not demonstrate repetitive and/or inappropriate behaviours.	a) Student matches loose symbols to a worksheet b) Student holds the glue and uses it to stick work down c) Student joins in a singing session either orally or by gesture
Passive Authentic Engagement	Student interacts appropriately with the learning environment without manipulation or vocalisation.	a) Student looks at staff or teaching materials during story time b) Student listens to / looks at staff explaining instructions c) Student watches another student take their turn during a turn-taking activity
Ritualistic Engagement	Student interacts with elements of the learning environment relevant to the activity, but in an inappropriate, ritualistic or repetitive manner.	a) Student holds the glue stick during a sticking activity but eats the glue or smears it on the table. b) Student holds or moves a pencil but does not attempt to draw, and instead twiddles the pencil between their fingers. c) Student uses a paintbrush but paints their hand instead of the paper.
Passive Non-Engagement	Student does not interact with the learning environment or do what is expected of them during the activity.	a) Student remains at the group table during an activity but stares out of the window. b) Student watches other students playing during choice time when they are supposed to be participating in a 1:1 teaching session. c) Student remains at group table during an activity but sits with their head in their hands, face down, and not attending to the activity.
Active Non-Engagement	Student interacts with the environment in an inappropriate manner by manipulation / movement and/or vocalisation.	a) Student sits at group table during an activity but spends their time whistling continuously and does not attend to the activity. b) Student gets up and wanders away from the activity. c) Student sits at group table during an activity but rocks backwards and forwards on their chair and does not attend to the activity.

Table 7.5: The five levels of engagement utilised

Focuses of Engagement	Definition	Examples
Authentic Engagement with a Person	Student is participating in an activity by interacting appropriately with a member of staff or another student.	a) Student approaches member of staff and requests something, either verbally or by gesture b) Student goes up to a member of staff and sits on their lap or hugs them. c) Student plays a game of catch with another student.
Authentic Engagement with Materials	Student is participating in an activity by interacting appropriately with chosen materials.	a) Student is drawing pictures on a notepad b) Student is dancing to music. c) Student is completing a puzzle.

Table 7.6: The two focuses of engagement utilised in the choice-time scale

7.6.1 Pilot Study and Resulting Amendments

A brief pilot study was undertaken at the beginning of the second year of the project with the students in the research classroom, during which a minimum of 5 observations were collected for each scale in order to assess their suitability. It was quickly observed that it was extremely difficult to record the use of prompts accurately within the scale for 1:1 work, since the staff were observed to interact with the students throughout 1:1 activities, and thus it was extremely difficult to distinguish between interactions and prompts. This difficulty was highlighted by Kishida, Kemp & Carter (2008, p. 161) during their discussion on the ICER-R, where they observed that "it was decided to exclude verbal and gestural prompts in the revised version … because of an apparent overlap between interaction and prompting behaviours." Based on this difficulty, the 1:1 scale was revised to replicate the independent work scale. Copies of the original 1:1 scale and all the final engagement scales used can be found in Appendices 4.1-4.5.

7.6.2 Inter-Observer Reliability Study

To obtain inter-observer reliability for the engagement scales and thus provide observer triangulation, duplicate observations were collected by both the researcher and a research assistant working at the school. Due to time constraints, the decision was made to use one group engagement scale and one individual engagement scale for the inter-observer reliability testing. The 1:1 work engagement scale and the group work engagement scale were chosen since these situations were felt to provide the more complex data collection scenarios. Due to the importance of collecting multiple observations, five sets of duplicate data were obtained for both the group work engagement scale and the 1:1 work engagement scale.

The inter-observer reliability data was collected using an alternative class group at the same school, comprising students not involved in the learning environments research, in order to ensure that neither of the observers had detailed knowledge of the engaged / non-engaged behaviours of the students. In this way it was anticipated that both observers would be able to make unbiased judgements as to whether the students appeared engaged or not based on the example guidelines illustrated in Table 7.5. The research assistant was provided with these definitions and examples as well as copies of the engagement scales in advance of undertaking the observations in order that they could familiarise themselves with the format of the data collection.

Prior to each observation session, both the researcher and the research assistant spent two hours in class with the students in order that the students could become accustomed to their presence. The research assistant had their own invisible clock set to vibrate at the relevant intervals. The clocks were started simultaneously at the start of each data collection session in order to ensure that observations were being obtained at the same moments. Inter-observer reliability was calculated from the duplicate results using point-by-point agreement: the number of agreeing observations was divided by the total number of agreeing and disagreeing observations, and multiplied by 100. The results from the inter-observer reliability sessions are shown below in Table 7.7 and Chart 7.1.

Session	1:1 work % agreement	Group work % agreement
1	80.8	87.0
2	89.5	85.0
3	76.9	80.6
4	80.6	87.5
5	84.0	88.5
Mean	82.4	85.7

Table 7.7: Percentage Inter-Observer Reliability

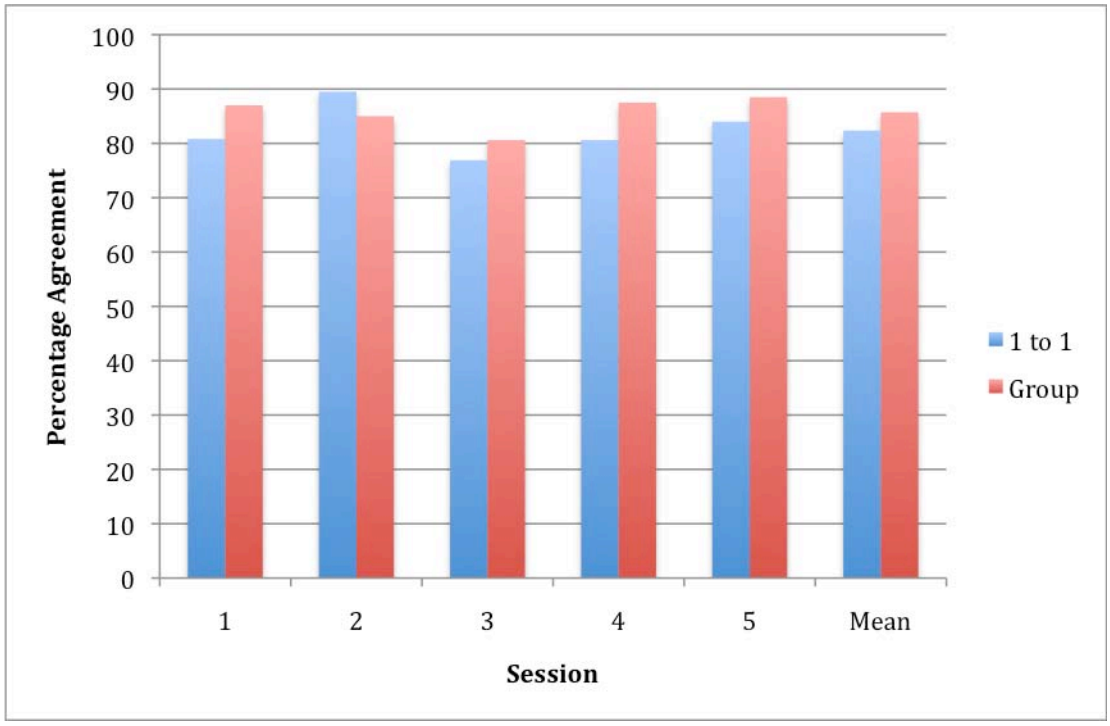


Chart 7.1: Percentage Inter-Observer Reliability

Mean inter-observer agreement for engagement during 1:1 work was 82.4% (range 76.9-89.5%). Mean inter-observer agreement for engagement during group work was 85.7% (range 80.6-88.5%). Since reliability agreement was shown to be on average greater than 80% for both the 1:1 work engagement scale and the group work engagement scale, this was considered to be sufficient based on the reliability criteria of 80% agreement utilised for other scales such as the Individual Child Engagement Record (ICER) (Kishida & Kemp, 2006a; Kishida & Kemp, 2006b).

7.7 Student Voice

As discussed in section 6.2, due to the special needs of the students involved in the present research, it was not possible to question them directly regarding their ideal learning environment. Consequently, the Mosaic approach (Clark & Moss, 2001) was employed, and as discussed through this chapter, a range of techniques including observations of student behaviour and interviews and questionnaires with relevant adults were employed in an attempt to access the students' voices indirectly.

However, the importance of attempting to obtain the students' opinions directly should not be underestimated. The value of gaining learner voice by listening to children's perspectives has been emphasised in a range of recent educational research

(Blackburn, 2010; Clark & Moss, 2001; Fielding, 2001; Rudduck & Flutter, 2003; Frost & Holden, 2008). Indeed “ensuring the genuine participation of people with learning disabilities in research about them is imperative” (Brewster, 2004, p. 166). Furthermore, the importance of providing people with learning disabilities with opportunities to make choices about issues which affect them is increasingly being recognised. The 2001 English White Paper ‘Valuing People, A New Strategy For Learning Disability For The 21st Century’ (DoH, 2001), highlights choice as a key principle of service provision. Nevertheless, the fairly unique nature of obtaining direct student voice in the present study is emphasised by the fact that only 8 years ago, Preece (2002) documented that no published research within the field of social care involving the direct participation of children with ASDs currently existed whereas numerous studies had been published involving the direct participation of students with other disabilities.

Nevertheless, whilst “it is inherent within the context of all learning disabilities that the voice of users of services should be heard … the very definition of their disabilities represents significant challenges in this area” (McKay, 2003, p. 208). It is thus important to acknowledge that “seeking the views of children and young people with learning disabilities in research … and allowing their voice to be heard is not without its challenges” (Germain, 2004, p. 170), and that “the challenge of doing so is magnified when we consider the implications of seeking the views of those unable to communicate in conventional ways (Brewster, 2004, p. 166). Graue & Walsh (1998) point out that undertaking research with children challenges researchers to be creative. Lewis & Porter (2004, p. 192) reiterate this, stating that “researchers and practitioners are continuing to push forward the boundaries of what is possible. Researchers are developing new skills and understanding in inducting novices into the research process.”

Beresford (1997, p. 184) outlines that “it is important for researchers to be flexible and to be prepared to adapt and change aspects of a research project to accommodate the needs and abilities of those participating.” Furthermore, Ware (2004) emphasises that it is essential for the researcher to reflect honestly on the limits of what can or cannot be achieved with the population of students involved. To this end, within the present study, whilst the initial intention was to formulate simple child conferencing interviews with visual supports to ask the students what they would like their new school to be like, it

soon became clear that presenting the students with such an open-ended and abstract question would not be successful, since individuals with ASDs have difficulty understanding abstract concepts (Peeters, Gillberg & Peeters, 1999). Consequently, the research design was amended to instead involve the students in evaluating trialled modifications to the learning environment at the end of the PAR phase of the project.

For students with ASDs in particular, the triad of impairments presents specific challenges to researchers wishing to consult children with this condition (McKay, 2003; Preece, 2002). It is therefore clear that, "innovative methods are required to facilitate access to the views of this population" of students (Germain, 2004, p. 170). Since the students in the research classroom were both profoundly autistic and largely non-verbal, it was not possible to employ more traditional methods of obtaining students' voices such as interviews or role play. As a result, it was necessary to identify innovative participatory methods by which to investigate student voice in the present study.

One such method is to provide students with cameras "to photograph their 'favourite' things", since "cameras are a medium which appeal to young children and provide a form of communication which is fun" (Clark & Moss, 2001, pp. 20-21). Furthermore, since "taking pictures is another way students can communicate nonverbally about what their school experience is like" (Borden, 2004, p. 2) this would seem an ideal methodology for use in the present study. To date, few studies have explored the use of cameras and photographs as a medium for communication within research for students with learning disabilities (Germain, 2004). However, studies which have used cameras have employed this approach to great effect. In a study by Whitehurst (2006a; 2006b) cameras were successfully used by students with profound autism during an evaluation of autism-specific residential accommodation.

In addition, studies by Booth & Booth (2003) and Germain (2004) highlighted the benefits which can be produced by giving students cameras in order to give them autonomy over their decisions, how they represent themselves, and how they choose to depict their situation. According to Booth & Booth (2003, p. 431), employing cameras through an approach called 'photovoice' "uses photography as a means of accessing other people's worlds and making those worlds accessible to others." Based on these

studies, the decision was made to utilise cameras to enable the students to evaluate their learning environment.

Another method which has been developed to assist students with limited verbal communication to have a 'voice' is Talking Mats. Talking Mats is an approach developed by Joan Murphey & Lois Cameron (2002) at the Augmentative and Alternative Communication (AAC) Unit at the University of Stirling. It is "a visual framework that uses picture symbols to help people with communication difficulties to think about issues and express opinions" (Wright, 2008, p. 33). Research suggests that Talking Mats provide "a reliable method of confirming views … people even with a severe learning disability can use Talking Mats to some degree as the mats appear to minimise distractibility, suggestibility and acquiescence" (Murphy & Cameron, 2002, p. 12). Whitehurst (2007, p. 58) writes that "this is a particularly useful tool for students with a diagnosis of autism who rely on visual clues and concrete symbolism." Consequently, due to the implicit visual structure within a Talking Mat, this appeared to be an ideal tool to obtain the students' views within the present research.

7.8 Grounded Theory Analysis: Key Concepts

As discussed in section 6.4, grounded theory was selected as the most suitable methodological approach by which to include the perspectives of additional practitioners within the present study in order to enable the views of all the students at the school to inform the research findings. Grounded theory analysis has a number of key principles which differentiate it from other data analysis procedures. These key principles shall now be discussed.

A key feature of grounded theory is that it involves a systematic and cyclical process of data analysis characterised by data coding and theory generation. However, there are now proponents of a variety of different procedures for undertaking grounded theory data analysis coding (Charmaz, 2006; Cohen, Manion & Morrison, 2007; Glaser & Strauss, 1967). Charmaz (2006) advocates that the process of data analysis should enable theories to be 'constructed'. This contrasts with the view expressed by the original proponents of grounded theory, Glaser & Strauss (1967) who stressed that this process enables theory to be 'discovered'. In this way, Dick (2006) suggests that Charmaz's approach is more faithful to being data-driven and responsive than that of other writers. Consequently, for the purposes of the present research, Charmaz's

procedure for data analysis and the subsequent 'construction' of grounded theory was employed.

According to Charmaz (2006), the process of generating grounded theory is a three-step process which involves:

- initial coding
- focused coding
- theoretical coding

The process of coding in grounded theory analysis is often described as a 'constant comparative' method of analysis, since the aim is to "compare data with data to find similarities and differences" (Charmaz, 2006, p. 54). A key benefit of undertaking this multi-step process of coding, is that it helps fulfil two criteria essential for a grounded theory study: that the findings 'fit' the reality in which your research took place and are grounded in the lived experiences of the participants, and that the findings are 'relevant' and useful to the participants. In addition, "careful coding also helps you to refrain from imputing your motives, fears, or unresolved personal issues to your respondents and to your collected data … [and] forces you to think about the material in new ways that may differ from your research participants' interpretations" (Charmaz, 2006, p. 54-55). In this way, rigorous coding can assist the researcher in achieving confirmability.

A final key element of grounded theory analysis is the use of memoing "to develop theoretical categories and their properties" (Hood, 2007, p. 161). According to Charmaz (2006, p. 72-3), "memos give you a space and place for making comparisons … and for articulating conjectures about these comparisons." Similarly, Strauss & Corbin (1990, p. 197) describe the function of memos as "written records of analysis related to the formulation of theory." In other words, they are a method by which deeper understanding and appreciation of the data is achieved in order to enable theory to be constructed from the data and codes. Memos can come in a variety of forms and frequently involve a combination of bullet points, prose and diagrams. To facilitate the generation of conceptually dense theory, memos are evaluated through a process of sorting to further crystallize emerging relationships.

In overview, the researcher theorises that the process of constructing grounded theory can be conceptualised as a cyclical and iterative process involving initial coding, focused coding, theoretical coding, memoing and sorting through which data is analysed and emerging theoretical concepts are gradually refined, as presented in Figure 7.1. This distinctive analytical procedure with a focus on theory development was again key to the selection of grounded theory as a research strategy for the present study, since although other analytic methods such as those employed by phenomenological research equally "begin with concrete instances of human experience and attend very meticulously to their moment by moment unfolding … [other] analysis remains descriptive and does not construct a theoretical model … as does grounded theory" (Wertz, 2008).

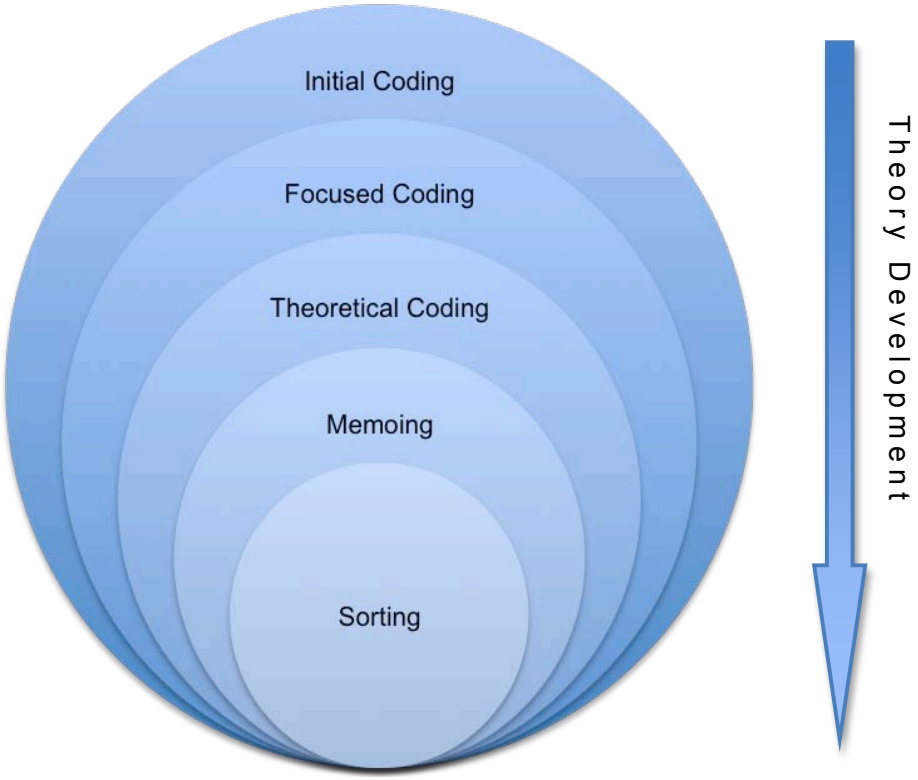


Figure 7.1: The process of grounded theory analysis

7.9 Conclusion

In conclusion it can therefore be seen that in order to fulfil the aim of this study - to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners - a range of research

methodologies were selected for use within the overall framework of the Mosaic approach devised by Clark & Moss (2001). The research methods selected were:

- a PAR spiral including:
    - unstructured participant observations of student behaviour
    - systematic engagement scale observations of student engagement
    - specially adapted methods of obtaining students voices
- a grounded theory study comprised of:
    - interviews, questionnaires and follow-up interviews with significant adults

CHAPTER 8
RESEARCH SETTING, SAMPLING, PARTICIPANTS, ETHICAL CONSIDERATIONS & METHODOLOGICAL PROCEDURES

8.0 Overview

Having discussed in detail the methodological and data analysis approaches and tools selected for use in the present study through chapters 6 and 7, this chapter shall now proceed to outline more specific details of the research setting, sampling and participants. In addition it shall consider how ethical considerations were addressed in the present study. It will conclude with an overview of the specific procedures undertaken in order to implement this research.

8.1. The Research Site: A Special School

This research took place within a residential school for students with severe and complex learning needs, where at present for the majority of students their learning needs arise from profound autism (Carpenter & Egerton, 2007). At the time of undertaking the research, the school had a total of 66 students, the majority of whom had 52-week placements at the school. The school employed over 500 staff, including teaching staff, a psychology and therapies team, an outreach service and care staff. The framework within which this study was conducted was particularly favourable, since full access to the research school had been arranged. In addition, the involvement of all staff currently employed by the school within the research process was permitted, and access to the students' records was allowed.

8.1.1 The Research Classroom

The PAR spiral was undertaken in a 'natural' ordinary working classroom within which students with profound ASDs received their education, supported by a class teacher and teaching assistants. The research classroom was a small bungalow separate from the main school. It comprised of two adjoining classrooms, a staff office which contained observation mirrors into both classrooms to assist with the research, and a toilet. Students only had access to the office when using the class computer.

8.2 The Research Participants: Sampling

Based on the Mosaic approach, which, as outlined in section 6.2 advocates that a multi-method approach combining (i) student observation, (ii) direct student voice, (iii)

the perspectives of parents and (iv) the perspectives of practitioners be utilised when undertaking research aimed at obtaining the views of non-verbal students, the key participants identified to be involved in this research were the students in the research classroom and their teaching staff and parents (within the PAR study), as well as other practitioners at the school (within the grounded theory study). The sampling process undertaken to select suitable participants for the study shall now be discussed.

8.2.1 Sampling of Participants for the PAR Study

The students were selected for involvement in the research project by senior management at the school, not by the author of this thesis. Students were chosen through a process of 'purposeful sampling', in order to ensure "information rich cases for study in depth … those from which one can learn a great deal about issues of central importance to the purpose of the research" (Patton, 1990, p. 169). Patton (1990) continues to identify 16 different types of purposeful sampling strategies. For the purposes of this research, 'typical case sampling' was employed, since the fundamental aim was to select students who were representative of the population of students attending the school. As such, as illustrated in Table 8.1 below, all the students had a diagnosis of either autism or autistic tendencies, and all but 1 had co-morbid diagnoses of severe learning difficulties. In this way, they were considered to be representative of the 'typical' student at the research school, where for the majority of students their learning needs arise from profound autism (Carpenter & Egerton, 2007).

However, it is important to recognise that whilst the social and sensory impairments discussed through chapters 2-5 are generally common to all individuals with profound autism, the way in which these manifest is different for each individual student. In addition, due to the nature of ASDs, students were also chosen who were settled at the school and were known to be able to cope with change and the presence of strangers in the classroom, in an attempt to ensure that the students did not experience any unnecessary stress as a result of their involvement in the research classroom. Furthermore, since the research classroom was first and foremost an ordinary working classroom in which students were undertaking daily lessons, students were also chosen for their ability to function effectively as a class group.

As with the students, staff were selected for involvement in the project by senior management at the school, not by the author of this thesis. The teaching staff were

selected through a process of 'snowball sampling' (also known as chain sampling), which Patton (1990, p. 176) describes as a process which "begins by asking well-situated people: "Who knows a lot about ____? Who should I talk to?". The positions were advertised within the school, detailing the demands of the project and the level of participation required to ensure a successful PAR team. Staff interested in participating in the research were asked to apply. From these applicants, senior management chose staff to work in the research classroom based on who they considered to be most suitably qualified through asking the questions:

- "who knows about research?"
- "who would be an effective member of the PAR team?"
- "who knows the students selected for the project well?"
- "who would work well together as a class team?"

The number of teaching assistants selected related to the staff:student ratio for which individual students had funding.

Finally, all the parents of the students involved in the research classroom were invited to participate in the research. In order to facilitate the involvement of these parents within the research process, since the research took place at a residential school and thus parents were not actually 'on-site' (as mentioned in section 7.5), the decision was made to incorporate the parents' perspectives through the grounded theory study being conducted alongside the PAR spiral.

8.2.2 Sampling of Participants for the Grounded Theory Study

Unlike other forms of data analysis, implicit to grounded theory is a specific approach to participant sampling termed theoretical sampling. According to Patton (2002, p. 38), theoretical sampling can be defined as the process of selecting "people on the basis of their potential manifestation or representation of important theoretical constructs." In other words, participants are selected to further the development of emerging theory. This form of sampling is based on the assumption that one does not know in advance the required sample population or sample size necessary for theory to be developed (Cohen, Manion & Morrison, 2007). Consequently, theoretical sampling continues until there is sufficient data to support the emerging theory. Rubin & Babbie (2009, p. 150) describe this process as:

> *"Theoretical sampling begins by selecting new cases that seem to be similar to those that generated previously detected concepts and hypotheses, but once the researcher perceives that no new insights are being generated from observing similar cases, a different type of case is selected until the observation of different types of cases seems to be generating no new insights."*

Through this process, theoretical saturation, "when the addition of further data yields no extra information to the properties of the categories already developed" (Taylor, 2008) can be achieved. The process of theoretical sampling which took place in this research shall now be discussed.

Initially, staff approached to participate within the grounded theory study were selected through purposeful 'criterion sampling', which Patton (1990, p. 176) defines as "criterion sampling is to review and study all cases that meet some predetermined criterion of importance." In this way it was possible to fulfil two aims. Firstly, that, as advocated by the Mosaic approach, all the parents of the students in the research classroom be approached to provide their perspective within the research, and secondly, that all the teachers at the school be invited to participate within the research in an attempt to ensure that the views of all the students at the school prevailed to inform the findings.

Following this initial process, additional participants were selected through a process of theoretical sampling, since this "is the principal strategy for the grounded theoretical approach" (Marshall, 1996, p. 523)**.** From the development of coding underway, it was clear that the teachers at the research school considered their teaching assistants to have a crucially important influence on the engagement and learning of the students. In addition, from classroom observations it was clear that the teacher and teaching assistants in the research classroom worked as a team, with all staff collaborating to share knowledge and develop insight to enhance the students' learning. For these reasons, it was felt that the teaching assistants held great potential to inform conceptually dense theory regarding the development of an appropriate learning environment for the students, and thus should be invited to participate within the research.

At this point, it was becoming clear that there was a lack of response from the parents of students in the research classroom (more details of which will be given in sections 9.1.2 and 12.2.2). Including the perspective of parents within this research was a high

priority, since this research strongly adhered to the view argued by the DfES Code of Practice on Special Educational Needs (DfES, 2001a, p. 16), which states that: "Parents hold the key information … They have unique strengths, knowledge and experience to contribute to the shared view of their child's needs and the best ways of supporting them." This view was reiterated by a questionnaire respondent, who stated that *"staff appreciation of issues relating to parents' wishes and concerns [is important], as dealing with parents can form a crucial element in the delivery of services for children with ASDs"* (R25).

Consequently, in the absence of parent feedback, in order to enhance the 'care' perspective within the emerging codes and theories, the decision was made to invite all senior care staff at the research school to participate within the research. Finally, as the development of codes and theory became more refined, to further elucidate the emerging codes and theories it became clear that other staff at the school whose expertise lay in particular areas, namely speech and language therapy, play therapy, educational psychology and outreach should be approached in order to further enhance the denseness of particular emerging codes and theories.

Within the present research, the population of participants was confined to those at the research school, and thus it was not possible to reach a position of irrefutable theoretical saturation for all the categories coded. However, this is a situation which has been encountered by other researchers undertaking grounded theory studies. For example, Hood (2007, p. 161) describes how "since I had to finish my dissertation, I cannot claim to have fully saturated the [categories] … but I did use all the relevant data … and managed a few rounds of theoretical sampling". Furthermore, according to Cohen et al. (2007, p. 494), "one can never know for certain that the categories are saturated, as there are limits to induction i.e. fresh data may come along that refute the existing theory. The partner of saturation is theoretical completeness, when the theory is able to explain the data fully and satisfactorily." Based on these views, within this research every effort was made to utilise theoretical sampling to the greatest extent possible in order to achieve theoretical saturation, however data collection was ceased once theoretical completeness was considered to have been achieved.

8.3 The students and staff involved in the research classroom

A total of seven students (see Table 8.1) participated in the PAR phase of this research project. Throughout the duration of the project, all the students involved were in keystage 3 or 4, ranging in age from 13-15yrs. The class teacher and senior teaching assistant remained in the research classroom throughout the data collection phase of the project. They were supported at all times by 2 - 3 additional teaching assistants, with a total of 5 different teaching assistants working in the research classroom throughout the duration of the project.

8.3.1 Descriptions of the Students Involved in the Research Classroom

Table 8.1 provides a more detailed overview of each individual student.
Notes for the following table:

1. The term ASD is used in this table to denote where a child has received a diagnosis of autism or Autistic Spectrum Disorder.
2. The abbreviation SCLD stands for Severe and Complex Learning Difficulties
3. The abbreviation SLD stands for Severe Learning Difficulties
4. Children who obtain a score in the probable difference range for their sensory profile are likely to experience difficulties with sensory processing that interfere with everyday living.
5. Children who obtain a score in the definite difference range for their sensory profile are likely to process sensory information in a different way to others, and struggle to keep up with what is going on in the environment.
6. Where N.R. is stated, the necessary information was not received to complete this section of the table.

Name	Age upon joining project	Sex	Primary Diagnosis	Co-morbidities	Sensory Profile	Duration of participation in project
Jane	12	F	ASD	SLD	Definite Difference	Yr 1 and 2
William	13	M	ASD	SLD	Definite Difference	Yr 1 and 2
Simon	13	M	ASD	SLD	Probable to Definite Difference	Yr 1 and 2
Joshua	13	M	ASD	SLD	Definite Difference	Yr 1 and 2

Name	Age upon joining project	Sex	Primary Diagnosis	Co-morbidities	Sensory Profile	Duration of participation in project
Chris	13	M	ASD	Demand - Avoidance	N.R.	Yr 1 only
Liam	14	M	Worster-Drought Syndrome	Autistic Tendencies; SLD	N.R.	Yr 2 only
Claire	14	F	ASD	SCLD	N.R.	Yr 2 only

Table 8.1: General information for the students involved in the project

As can be seen in Table 8.1, the students involved in this research had a variety of comorbid diagnoses. As described in detail in chapter 3, the aetiology and symptomatology of autism brings with it a number of learning challenges for these students. However, the collective impact of these coexisting conditions is also worthy of note. It is gradually being recognised that the changing pattern of childhood disability touched upon in section 2.1 is increasingly giving rise to "a new breed of children with complex learning needs … those children in whom two or more disabling conditions co-exist" (Carpenter, 2010c). According to Dittrich & Tutt (2008), "the question then arises as to how to educate these more complex children." Furthermore, Carpenter (2010c) highlights that this is a "group of children … who do not fit the current range of learning environments."

According to Jordan (2001, p. 11) "children with autism and sld are likely to show a developmental pattern that is both deviant and delayed; it is the deviance due to the autism that will have the greatest impact on teaching and learning, but neither aspect can be ignored." Whilst clearly the starting point for the students involved in this research must be the abundance of knowledge that already exists surrounding the education of students with autism (e.g. their predominantly visual learning styles) and the lessons which are emerging from neuroscience (see section 3.2), it is nevertheless important to recognise the complex learning needs of the population of students with whom this research took place. Furthermore, since there is currently underway a government-funded nationwide research project commissioned to illuminate the learning pathways of students with complex learning difficulties and disabilities (CLDD), this research holds the potential to contribute towards a growing body of knowledge surrounding the education of students with complex needs.

8.3.2 The Change in the Student Cohort

Five students joined the research classroom from the outset, of which one left the project for reasons unrelated to the research after one year. In the first year of the project, one classroom formed a base for students Jane[4], William, Simon and Joshua, supported by the class teacher, a senior teaching assistant (TA) and two additional TAs. The second room formed a base for student Chris, supported by another TA. This was a necessary separation, since Chris' demand-avoidance resulted in him being unwilling to share a classroom with other students. It was hoped that as the project progressed Chris would gradually integrate with the other students as the environment became more amenable, however unfortunately this did not take place, and his behaviour and participation in school activities gradually diminished.

By the end of the first year of the project various concerns were raised by the classroom staff regarding the suitability of the research classroom for meeting the needs of Chris, as well as the impact of his behaviour on the other students in the classroom. Consequently, although it had initially been the intention that the cohort of students involved in the project would remain consistent throughout the predicted two year length of the project, it was necessary to intentionally sacrifice any strict control regarding the project participants in order to ensure that ethical standards were met, and that the welfare of the students remained paramount.

Chris was subsequently placed in an alternative classroom setting which was considered to better suite his individual needs. Assessment of the other four students after the first year of the project found that they were progressing well within the research classroom, had bonded as a class group, and were benefitting positively from the changes implemented. Since, for the reasons outlined above, Chris had initially occupied an entire classroom to himself, it was possible for two additional students to be placed in the research classroom for the second year of the project. The remaining four students were thus joined by two more students for the second year of the project. As for the initial cohort of students, the additional two students were chosen by senior management at the school, not by the author of this thesis.

Nevertheless, the additional two students brought a thoroughly beneficial increase in diversity to the student group involved in the project, through the involvement of an

[4] To protect the identities of the students, pseudonyms are used throughout this thesis

additional female student, and a male student with a primary diagnosis of Worster-Drought Syndrome. Whilst it is the case that autism is significantly more prevalent amongst males than females, there are still a significant number of female students at the research school. As such, the presence of an additional female student in the research classroom ensured that both genders would be fully represented in the plans for the new school. In addition, as discussed in section 8.3.1, there is a growing number of students presenting with complex needs arising from co-morbid diagnoses. Consequently, having the opportunity to include a student with a primary diagnosis of Worster-Drought Syndrome, coupled with co-morbid diagnoses of autistic tendencies and severe learning difficulties, provided further opportunity to consider this complex population of students within this research.

8.3.3 Descriptions of the Staff Involved in the Research Classroom

Name	Sex	Staff Role	Duration of participation in project
T	F	Teacher	Yr 1 and 2
STA	F	Senior Teaching Assistant	Yr 1 and 2
TA1	F	Teaching Assistant	Yr 1 and 2
TA2	F	Teaching Assistant	Yr 1 only
TA3	M	Teaching Assistant	Yr 1 only
TA4	F	Teaching Assistant	Yr 2 only
TA5	F	Teaching Assistant	Yr 2 only

Table 8.2: General information for the staff involved in the project

The class teacher and senior teaching assistant remained in the classroom throughout the duration of the data collection phase of the project. TA3 was specifically allocated to student Chris, and thus left the project when this student was transferred to another class at the end of the first year. TA 2 also chose to transfer to another class after the first year for reasons of personal development and experience. TA4 and TA5 thus joined the research classroom at the beginning of the second year of the project to replace those staff who had left.

8.4 Ethical Considerations

When conducting research involving human beings, there will always be associated ethical issues which require consideration. It is the responsibility of researchers to safeguard the interests of those involved in, or affected by, their research, and to ensure that all findings are reported accurately and truthfully. According to the Social

Research Association (SRA, 2003, p. 7), “in recent years ethical considerations across the research community have come to the forefront. This is partly a consequence of legislative change in human rights and data protection, but also as a result of increased public concern about the limits of inquiry.” As such, ethical principles for conducting research with human participants are formally published by organisations such as the British Psychological Society (BPS) and British Educational Research Association (BERA) and include guidelines for: consent, deception, debriefing, withdrawal, confidentiality and protection (BERA, 2004; BPS, 2000).

Furthermore, it is essential that all research is accepted and overseen by a research and ethics committee. To this end, the present research was seen to meet ethical standards by the ethics committee at the University of Worcester. In addition, due to the vulnerable nature of the students involved in this research, this research also received ethics approval from the Research Institute at the school at which the research was conducted, and the research was reviewed on a termly basis by their research and ethics committee. As such, this project followed the ethical guidelines for research set out in the school’s research ethics policy: “to ensure the protection of the rights of participants in research, co-researchers and families, and the integrity of (name of school) as a research focused organisation, through scrutiny, consent, withdrawal, briefing, de-briefing, confidentiality, proper conduct, dissemination and anti-plagiarism.”

The ethical considerations for this research fell into two categories:

1. Ethical issues surrounding the involvement of the adults participating in the research
2. Ethical issues surrounding undertaking research with students with special needs.

According to Brown (2007, p. 12) “Undertaking research with any vulnerable group is challenging and presents ethical issues that need to be addressed.” Nevertheless, despite the vulnerable nature of the students involved in the current study, the ethical framework within which this study was conducted was particularly favourable, since the school has a thriving research department, and parents are fully supportive of their children’s involvement in the projects.

8.4.1 Consent and Respect for the Participants' Interests

According to Robson (2002), two key ethical concerns when undertaking research are those of consent and respect for the participant's interests. For the adults working in the research classroom, informed consent was obtained through ensuring that staff applying to work in the research classroom were fully informed of the details of the research and the implications this would have for them. For the students, parental consent for the students' involvement in the project was granted for all the students involved either prior to the commencement of the project, or prior to them joining the research class.

At present there remains debate surrounding the issue of whether or not it is always possible to obtain informed consent for involvement in research from very young children and those with learning disabilities (Stalker, 1998). Detheridge (2000, p. 114) states that "it is unlikely that children with profound communication or intellectual impairments will be able to give permission for their involvement in a study." According to Beauchamp and Childress (2001), in order to provide informed consent, three criteria must be met:

1. Adequate information – that sufficient information is provided to ensure that participants understand what the research entails
2. Voluntariness – that participants understand that they are under no obligation to participate and are free to withdraw at any time
3. Competence - that participants are capable of understanding what the research will entail and of using the available information to make an informed decision as to whether or not they wish to participate.

During discussions with the teaching staff working in the research classroom, the team outlined concern that the students' complex needs would prevent them from meeting the criteria of competence. Whilst the project centred upon liberating the students' views, and placed strong emphasis on supporting the students to make choices regarding their ideal learning environment to inform the research findings, as described in section 7.7, it was recognised that it would be necessary to adapt the approaches used to address the students' limited powers of abstraction, and consequent need for concreteness (Preece, 2002).

According to Harris, (2003, p. 7), “making choices is a complex, and as yet, poorly understood activity.” Since understanding the meaning and purpose of the research prior to it taking place would clearly require powers of abstraction, it was considered that it would not be possible to present the issues surrounding informed consent in a way which would enable the students participating in this research to understand the information or make a decision based upon it. In addition, there was concern that bombarding the students with abstract concepts relating to issues of consent which may be beyond their understanding, would lead to unnecessary anxiety for the students, and would in fact be unethical.

As a result, within this research, the decision was made not to seek informed consent from the students themselves. Instead, the decision was made to adopt an ongoing process of assent whereby the students’ acceptance of the researcher within the classroom and willingness to participate in student voice activities would be taken as assent to participate in the research. In addition, staff were empowered to make judgements regarding any unwillingness to participate or distress exhibited by the students in relation to the research, and to allow withdrawal as appropriate. This indirect approach for assent/dissent has been successfully used within other research with students with profound autism and severe learning disabilities (Beresford, 1997; Konaka, 2007c; Pauli, 2004; Preece, 2002). Furthermore, in order to ensure respect of the students’ interests, it was acknowledged that no actions would be taken that were not anticipated to be of benefit either to the students directly involved in the research or the wider school population. In addition, great care was taken to ensure that no student would come to any harm either physically, psychologically or emotionally as a result of participation in this research.

8.4.2 Other Ethical Considerations

Aside from the issues of consent and respect of the participant’s interests, there are a number of other ethical issues which require consideration when undertaking research with human participants. One such issue is that of confidentiality and anonymity. Porter & Lacey (2005, p. 94) highlight that “good practice dictates that individuals should not be identifiable in the research, not least because of the possible unforeseen outcomes of the research and its dissemination.” Within small-scale research, especially that involving individuals with learning disabilities, establishing anonymity requires particular consideration, since “populations are often small, and the combination of individuals’

characteristics can provide distinctive individual profiles" (Porter & Lacey, 2005, p. 94). In order to ensure confidentiality and anonymity within the present research, all data will be stored confidentially and anonymised within written reports, in order to ensure that no specific individual will be identifiable.

Another ethical consideration which relates specifically to research being undertaken with vulnerable individuals, is the impact of the relationships which are formed as a result of the research process. For students in residential care, such as those involved in this research, attachment issues arising from "a succession of different faces drifting in and out of these people's lives" (Stalker, 1998, p. 10) require careful thought and consideration. In the present research, the researcher was reassured that the students were accustomed to transient relationships with both teaching staff and carers. Furthermore, since it was anticipated that the research would be on-going for a period of 2 years, it was decided that the students could be prepared for the researcher leaving in the same way in which they would be supported when other teaching staff left the school.

Other ethical issues which require special consideration when undertaking research with individuals with special needs relate to "recognition, feedback and ownership" (Lewis & Porter, 2004, p. 193). It is increasingly being acknowledged that it is important to disseminate the findings of research in a manner which is accessible to those who have taken part (Goodley & Moore, 2000). To this end, a display board was created to chart the progress of the research visually through photographs for the students at the school. In addition, written reports were disseminated to all the staff at the school at the end of each year of the project to ensure that they were aware of the progress and would be able to answer any questions students asked. Furthermore, the final outcomes of this research were available to the students in a particularly tangible form through their access to the new school building. With regards to ownership, the findings of this research are owned by both the research school and Worcester University. Adult participants were informed of their right to access or withdraw any data directly relating to them, and staff supporting students during student voice activities were made aware that students could receive copies of their completed tasks if this would be useful or appropriate.

8.4.3 Methodological Ethics

Ethics in Action Research

According to Robson (2002, p. 70), "certain styles of real world research carry with them additional ethical implications. For example, 'action research' goes beyond the usual concerns for consent, confidentiality and respect for the participants' interests." This view is reiterated by Cohen et al. (2000, p. 66) who highlight that "the area of qualitative research where one's ethical antennae need to be especially sensitive is that of action research." PAR is carried out in real-world circumstances, and involves close and open communication between all individuals involved. As such, close attention must be paid to ethical considerations whilst conducting the research. Winter (1996, pp. 16-17) outlines some of these:

- "Make sure that the relevant persons, committees and authorities have been consulted, and that the principles guiding the work are accepted in advance by all
- All participants must be allowed to influence the work, and the wishes of those who do not wish to participate must be respected
- The development of the work must remain visible and open to suggestions from others
- Permission must be obtained before making observations or examining documents produced for other purposes
- Descriptions of others' work and points of view must be negotiated with those concerned before being published
- The researcher must accept responsibility for maintaining confidentiality"

Within the present research, these criteria were met through obtaining informed consent from all the staff involved in the research classroom, and the parents of the students involved, as well as through obtaining approval from both the University of Worcester and research school ethics committees as outline above. In addition, as discussed in chapters 6 & 7, methodologies were selected in order to ensure that all relevant parties were supported to actively influence both the research process and the research findings. Furthermore, regular team meetings were undertaken to provide an open forum for debate.

Ethics in Interviews & Questionnaires

To ensure that ethical guidelines were followed during the processes of interviews and questionnaires, individuals were asked to provide written informed consent prior to participating. A copy of the consent forms used can be found in Appendices 1.1-1.2. In overview, participants were informed of the project both in writing and through verbal conversation. Once participants were sure that they fully understood the purpose of the research and their role within it, participants were asked to sign the consent form. This highlighted that individuals were under no obligation to participate, they could withdraw at any time without prejudice, they could receive copies of any data relating to them, the data would be kept confidentially, and no individual would be identifiable in any written report of the findings.

8.5 The Methodological Procedure

The procedures through which each of the methods used in this research were employed shall now be discussed.

8.5.1 The PAR Spiral

A PAR spiral was devised for this research based on the four-stage cyclical process originally presented by Lewin (1946).

1. **Identifying the problem:** Identify which areas of the classroom learning environment require modification to create a learning environment which supports students with autism to engage as effective learners
2. **Planning:** Plan and source suitable modifications to the learning environment
3. **Action step:** Introduce the modification to the classroom
4. **Evaluation:** Evaluate the modification to determine if it is successful at promoting student engagement

The PAR plan derived from this and utilised in the present research can be seen in Figure 8.1.

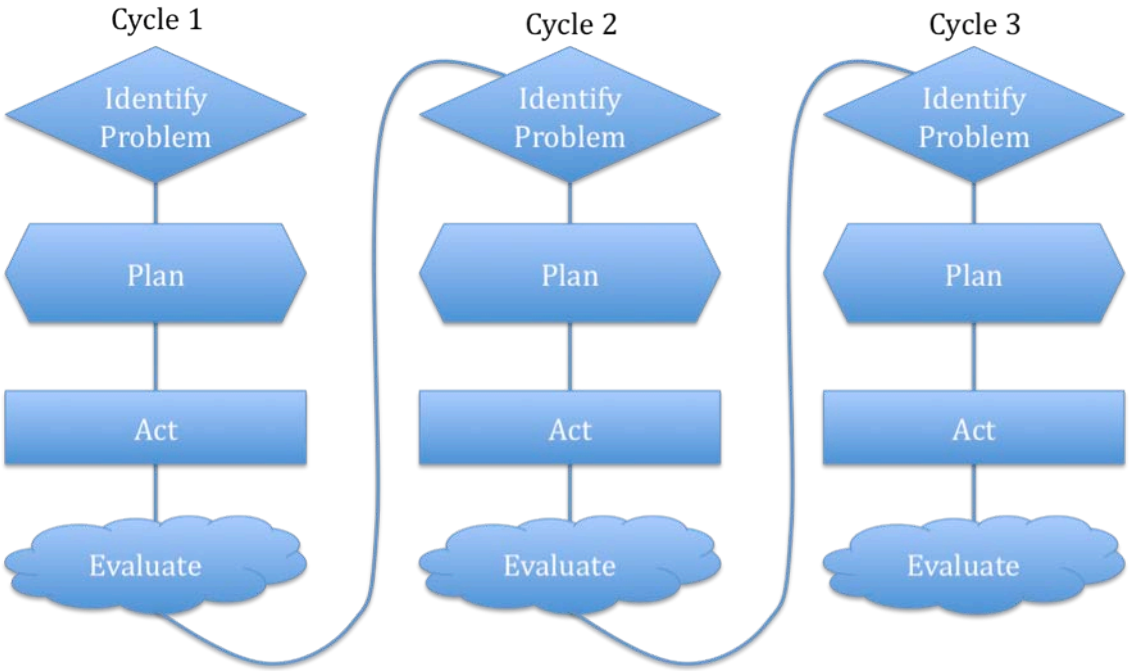


Figure 8.1: The PAR Spiral utilised in the present research (adapted from Riel, 2007)

As this research evolved, it became clear that in addition to the overall meta-spiral taking place within the research classroom, many of the modifications trialled were creating their own sub-spirals within the overall framework of the research, since it frequently took more than one attempt to resolve a particular identified problem. These sub-spirals followed the same overall structure as the meta-spiral described above.

Since the PAR spiral took place within the research classroom, the researcher, teacher and teaching assistants within the class formed the primary PAR team and undertook continual and ongoing informal discussion and debate throughout the PAR process which was documented through field notes in a research journal. This group of co-researchers also met formally at least once every half-term to collaborate and discuss the progress, findings and implications of the research project. To facilitate the involvement of the students as crucially important 'relevant parties', in addition to observations of student behaviour and engagement, and despite complications arising from the students' learning difficulties, methods were explored to ensure that the students received opportunities to directly express their views regarding the learning environment. As outlined in section 8.2.2, the decision was made to incorporate the views of parents within the concurrent grounded theory study.

8.6 Identifying Problems

The process of identifying areas of the classroom learning environment which required modification in order to support the complex needs of students with ASDs incorporated two distinct elements. Firstly, classroom observations and engagement scale data were collected within the research classroom. Secondly, the grounded theory study was conducted and utilised to further inform the research process through the development of conceptually dense theory. The procedures by which the specific research methods were undertaken shall now be discussed, prior to reviewing the findings of this research in chapters 9, 10 & 11.

8.6.1. Classroom Observations

Classroom observations were collected within the research classroom throughout the two year duration of the PAR phase of this project. Observations were collected by the researcher through field notes, and by the classroom staff by keeping a log of students' behaviours. After the initial introductory period, the researcher spent on average 1 or 2 half-days a week within the research classroom during the school term. This was increased when necessary to collect data prior to or following a modification. In an attempt to take account of extraneous variables with the potential to impact on the findings, sensitivity to the moods and behaviour of the students was essential, and observations were discarded if students demonstrated noticeably unusual behaviour such as if a behavioural incident occurred during data collection.

The process of collecting classroom observations served two distinct functions within the first year of the project. As anticipated, classroom observations were utilised to identify and evaluate features of the learning environment which required modification in order to facilitate student engagement. These unstructured observations were obtained in two ways. Firstly, field notes were collected. Secondly, photographs were taken to consolidate classroom observations and track changes. According to McNiff, Lomax & Whitehead (2003, p. 126) "the main use of photography in action research is to document action." In addition, Razvi (2006, p. 1) highlights that "image-based research has been used to enhance and even replace textual communication." Within the context of the present research, the use of visual means of data collection was particularly valuable since "images honor the preferences of visual learners so have much to contribute" (Razvi, 2006, p. 1).

As raised throughout this thesis, many students with autism are visual learners. Consequently it was important to track the research through photographs, and a display board was created which followed the progress of the research visually for the students. In addition, these photographs were important to feed into the development of visual methods to obtain the students' views regarding trialled modifications. Since 'a picture speaks a thousand words', the photographic evidence collected will be presented where appropriate throughout the thesis to provide additional explanation of classroom observations and modifications discussed.

The second function of the classroom observations, was that they served to identify the fact that student engagement represented a key criteria necessary to promote effective learning in this group of students, a concept which, as shown in chapter 4, is widely supported by research literature. Consequently, in the first year of the project, alongside the process of identifying and modifying the learning environment, the concept of engagement was thoroughly researched, and as outlined in section 7.6, novel engagement scales anticipated to be sensitive to the unique learning profiles of students with autism were devised in order to enable measurements of student engagement to enhance the findings of this research. The scales created can be seen in Appendices 4.1 – 4.4.

8.6.2 Engagement Scale Data

The engagement scales designed and utilised in the present study can be seen in appendices 4.1-4.4. Observations were noted at either 15s intervals (for the individual engagement scales) or 30s intervals (for the group engagement scales), and were collected for a total of 5 minutes and 10 minutes respectively. An invisible timer clipped to the researchers' belt was set to vibrate at the appropriate interval to alert the researcher to collect the next observation. In an attempt to control for extraneous variables which may influence the findings, students were given a period of time to explore and adjust to newly introduced modifications during which their reactions were noted through observations of their behaviour, but no engagement scale data was collected, in an attempt to ensure that the engagement data was not influenced by students' initial responses to a change in their environment.

In addition, data was discarded for all scales if a student being observed was demonstrating noticeably unusual behaviour such as if a behavioural incident occurred

during data collection. For the individual engagement scales, data was also discarded if an individual student either participated in the activity for a total duration of under 120 seconds (8 observations) or if they abandoned the activity for greater than 120 consecutive seconds (8 observations). For the group engagement scales, data was discarded if the group engaged for less than 4 minutes in the activity (8 observations).

According to McWilliam & Ware (1994), it is important that multiple sessions be observed in order to avoid one unusual session erroneously influencing the results. For this reason, for the individual engagement scales, a minimum of 5 observations were obtained per child following each modification to the environment, with more being collected where time allowed. Similarly, for the group engagement scales, a minimum of 5 observations were obtained for the group following each modification to the environment, with more being collected where time allowed.

8.6.3 Sensory Profiles

As discussed in the literature review, individuals with autism frequently experience sensory processing and regulatory difficulties (see sections 2.3.3 and 2.3.4), and this has the potential to dramatically influence what constitutes an optimal learning environment for these students (see chapter 5). Consequently, an occupational therapist at the research school was approached to provide sensory profiles for all 7 students involved in the project. Sensory profiles were actually received for 4 of the students in the research classroom. Sensory profiles "can help identify a student's sensory processing patterns; the results can then be used to consider how these patterns might be contributing to or creating barriers to performance in the classroom" (Dunn, 2008a, p. 1). When a student has difficulty with sensory processing, certain forms of sensory input can be confusing, upsetting, or not meaningful to the student; these forms of sensory input can subsequently interfere with the students' ability to effectively engage in learning.

8.6.4 Interviews with Teachers

All interviewees were informed of the details of the study, including ethical and confidentiality considerations, and their consent to participate was sought prior to commencing the interview. A copy of the consent form can be seen in Appendix 1.1. All interviews were conducted face-to-face and digitally recorded to enable continued and reflective analysis. Permission to record was also sought from interviewees prior to

commencing the interview. Interviews were transcribed verbatim for content alone. It is acknowledged that in so-doing, data will inevitably have been lost from the original encounter (Kvale, 1996), however more ambitious analytic approaches such as discourse analysis may equally have detracted from the issue being addressed (Silverman, 2006).

Interviews were conducted using the semi-structured interview schedule presented in Appendix 2. The process through which the interview schedule was created was discussed in section 7.4.3. The interviews focused on three main topics:

1. The relationship between student engagement and learning
2. Aspirations for the design of classrooms in the new school
3. The suitability of the current classrooms, with particular reference to the physical environment, teaching pedagogy and staff

A copy of an example interview transcript can be found in Appendix 5. Transcribed interviews were analysed through grounded analysis to identify emerging themes, since “a recurrent theme in interviews indicates that the idea/issue is something which is shared among a wider group, and therefore the researcher can refer to it with rather more confidence than any idea/issue which stems from the words of one individual.” (Denscombe, 2007, p. 187). Initial and focused codes, along with examples of teachers’ comments will be provided within the discussion of the relevant problems. Due to word limit constraints, only one comment shall be presented within the text of this thesis for each category or sub-category discussed. Additional comments are presented in Appendix 8.

8.6.5 Questionnaires

Questionnaires were sent to all teaching assistants, care team leaders and deputies, psychologists and therapists, the school assessment and outreach service and deputy head teachers, as well as to parents of the students in the research classroom. This amounted to a total of 96 individuals, comprising 90 members of school staff, and 6 sets of parents. Questionnaires were sent to school staff by e-mail to print out, and via a link to an online website where it was possible to complete the questionnaire online, in an attempt to make responding as simple as possible. For parents, questionnaires were sent on hard copy, with a link to the online website also provided as an option.

The questionnaires were analysed using the process of grounded theory analysis described by Charmaz (2006) to identify emerging themes and determine which issues respondents considered to be important when designing a learning environment for students with autism. As with the interviews, initial and focused codes, along with examples of teachers' comments will be provided within the discussion of the relevant problems. Due to word limit constraints, only one comment shall be presented within the text of this thesis for each category or sub-category discussed. Further comments are presented in Appendix 8.

8.6.6 Follow-up Interviews

Follow-up interviews were conducted with four of the 28 questionnaire respondents in order to clarify their responses to certain questions and investigate issues they had brought up in greater depth. Since the surveys conducted in this research were undertaken within a grounded theory framework, individuals were chosen for follow-up interviews through the process of theoretical sampling. Consequently, individuals were selected for follow-up interview based on the content of their questionnaire responses, with follow-up interviews being undertaken with those who had provided particularly insightful and detailed responses which were considered to hold the potential to further inform the theoretical constructs developing through the grounded theory analysis concurrently underway. All four follow-up interviews were conducted directly from the individual's questionnaire responses in order to delve in greater depth into their responses.

The follow-up interviews were analysed using grounded theory to identify elements of the learning environment requiring consideration to support students with autism to engage as effective learners. As with the interviews and questionnaires, initial and focused codes, along with examples of respondents' comments will be provided within the discussion of the relevant problems. Due to word limit constraints, only one comment shall be presented within the text of this thesis for each category or sub-category discussed. Additional comments shall be presented within Appendix 8.

8.7 Planning Resolutions

As problems were identified, it was initially necessary to determine which could be realistically resolved through practical means of trialling modifications within the

research classroom, and for which identified problems a more theoretical approach to resolving the issue would have to be undertaken for logistical and/or financial reasons. Appropriate planning, involving discussion amongst the PAR team, a review of relevant literature and investigation of suitable products available was then undertaken to identify ways to resolve the identified problem. In order to source necessary modifications to the learning environment, mutually beneficial research partnerships were formed with a number of external companies and experts to enable existing products to be adapted to meet the unique needs of this complex group of students.

8.8 Action Step

For those problems identified as suitable for practical trialling of alternatives within the research classroom, a modification was introduced into the research classroom. To endeavour to limit the impact of extraneous variables on the findings, and to ensure that the specific impact of a single trialled modification could be determined, modifications were introduced linearly and singularly, such that no two modifications were introduced simultaneously. In this way it was anticipated that data collected following the introduction of each trialled modification would reflect the impact of the specific modification trialled and enable the effectiveness of each specific modification to be assessed. In addition, the students were given the opportunity to explore and adjust to newly introduced modifications during which time their reactions were noted through observations of their behaviour.

As the project evolved, it became clear that many of the problems were not resolved with the first attempted action step. Consequently some of the problems generated their own sub-spirals within the overall framework of the project as multiple attempts were made to successfully modify the environment within the research classroom and resolve the problem. The action steps undertaken will be discussed in the results sections in greater detail. Additionally, for those problems for which it was not possible to trial practical resolutions, theoretical action was nonetheless taken, and solutions were researched and discussed with research school. These will be discussed in chapter 11.

8.9 Evaluation Step

A combination of classroom observations, feedback from teachers at the research school and engagement scale data were utilised to determine whether modifications

trialled within the research classroom were successful. During the first year of the project, whilst the concept of engagement was explored, and suitable scales were designed, the emphasis was placed on collecting unstructured classroom observations. Once the engagement scales became a firm part of the data collection methodology in the second phase of the project, the emphasis shifted towards engagement scale data, although unstructured observations continued to be collected to both ensure rich data and support data and methodological triangulation.

8.9.1 Feedback from Teachers

Following the introduction of bespoke furniture into the research classroom during the second year of the project, all the teachers at the school were invited to visit the classroom to provide feedback on the suitability of the furniture. These teachers met with the teacher of the research classroom to discuss the prototype bespoke furniture in order to identify which elements of the design were beneficial, which elements they considered to require further modification, and any suggestions they had for improvements to the design.

8.10 Evaluation through Student Voice

As discussed in section 7.7, in order to provide the 6 students in the research classroom with a suitably concrete opportunity to provide their direct views, the decision was made for students to be given Talking Mats and cameras at the end of the PAR phase of the project.

For the camera task, students were given disposable cameras and presented with visual symbol instructions to take photographs of their favourite things in the classroom. For the Talking Mats, students were provided with both ‘before’ and ‘after’ photographs for all the modifications which had been implemented within the research classroom. The students were also provided with a mat divided into ‘like’ and ‘dislike’ and prompted to place the pictures into one of these categories.

Students were supported to complete all of these tasks 1:1 by teaching assistants who new them well, since as highlighted in chapter 7, “there is unlikely to be a substitute for working alongside people who know the individual well and can draw on the experience of what works with him or her” (Walmsley, 2004, p. 60). The results obtained from these will be presented at the beginning of chapter 11.

8.11 Data Analysis Procedure

The procedures by which all the data obtained through this research were analysed shall now be discussed.

8.11.1 Analysis of Observation Data

A detailed observation schedule was collated from classroom observation field notes collected by the researcher and a log filled in by the teaching staff. During this process similar observations were assigned codes which were utilised to inform the identification of problems in the learning environment. For example, students were frequently observed to rock back on their chair legs. Thus, all observations related to this were coded “chair rocking”, and modifications to the environment which addressed this issue were explored. A section of the collated observation schedule is presented in Appendix 7.

8.11.2 Statistical Analysis of Engagement Scale Data

In order to analyse the quantitative data collected through the engagement scales, statistical analysis was performed, generating descriptive statistics which were then collated to produce tabulated and graphical summaries of the students’ engagement at various stages of the research process. These shall be presented within the relevant sections of the results chapters.

8.11.3 Grounded Theory Analysis

As outlined in section 7.8 the process of grounded theory data analysis undertaken within this research was conducted in accordance with the guidelines for grounded theory analysis proposed by Charmaz (2006). As previously discussed, both action research and grounded theory research emphasise a non-linear approach to data collection and analysis, with data collection and analysis occurring concurrently. However, chronicling data analysis in non-linear form is necessarily complicated. Consequently, whilst the processes of initial coding, focused coding, theoretical coding and memoing shall be discussed sequentially, it is important to recognise that in reality this was not the case.

Initial Coding

Once an interview was transcribed or a questionnaire was received, the transcript or responses were then carefully coded using incident-by-incident coding. Charmaz (2006, p. 49) advises that initial coding be done using gerunds since "we gain a strong sense of action and sequence with gerunds. The nouns turn these actions into topics." Consequently the initial coding was done using gerunds since this supports the researcher to "detect processes and stick to the data" (Charmaz, 2006, p. 49). Examples of such codes within this research were *"noise affecting students"* and *"lighting needing to be dimmable."* A list of all the codes created during the initial coding process, including the number of respondents who made comments relating to each code is presented in Appendix 6. Since this research primarily focused on the physical environment, initial coding was only undertaken for this topic, since the sheer number of initial codes which were generated when the teaching approach and resources and people in the environment were included made the task excessively cumbersome, and the researcher was aware that it would not be possible to directly influence the majority of these aspects within the course of this research. Consequently for these elements of the learning environment only more general focused codes were identified.

Focused Coding

Once a raw data source has been designated initial codes, it is then necessary to classify these under broader conceptual categories to facilitate theoretical development. This is highlighted by Coffey & Atkinson (1996, p. 48) who write that "the establishment of order relationships between codes and concepts is a significant starting point for reflection and for theory building from qualitative data." During the process of initial coding and data collection, it soon became apparent that certain categories were emerging within the data. For example, it was soon evident that many respondents were discussing issues relating to the classrooms being too hot, which led to the category of "room temperature." Consequently, whilst initial coding continued, focused coding also commenced, generating a smaller number of focused codes within which initial codes could be grouped.

At this stage it is important to accept that not all codes will remain to inform the theoretical development, since some codes will not fit in with the emerging categories and will need to be removed from the analysis (Creswell, 1998). Furthermore, some initial codes were categorised under more than one focused code, for example the

initial code of *"using the right colour"* was incorporated into the category of "furniture and furnishings" which included information relevant to the subcategories of "group table", "independent workstation", "classroom upholstery", "rocking chair", "flooring" and "school chair."

Theoretical Coding

Following the process of focused coding, it was necessary to determine how the categories developed related to each other. The process of theoretical coding aims to enable the researcher to identify core themes central to the phenomenon being explored, which in the case of this research was aspects of the learning environment which require consideration to support students with profound autism to engage as effective learners.

Memoing & Sorting

To assist in the process of theory construction, memo writing was undertaken to enhance understanding and insight into the data, and help elucidate emerging theory. Memos were then further explored through a process of continual sorting, deconstruction and reorganisation to assist in the formulation of theory.

8.12 Process of Reflexivity

As discussed in section 6.7, qualitative research acknowledges the role of the researcher as a research instrument. Consequently, it is important to foster reflexivity in order to make explicit the beliefs, perspectives and biases of the researcher and endeavor to enhance confirmability. Cohen & Crabtree (2006), suggest that in order to foster reflexivity, a researcher can employ three approaches:

1. use multiple investigators to foster dialogue through which researchers' beliefs, values, perspectives and assumptions can be revealed and contested
2. keep a reflexive journal to enhance a critical and reflective perspective
3. report research perspectives, positions, values and beliefs in publications

Within the present research, all three approaches were employed to promote reflexivity. Within the PAR spiral, the researcher and teaching staff in the research classroom met regularly to partake in dialogue regarding the research process and findings. This also provided an opportunity to foster reflexivity. The lead researcher

also kept a reflexive journal, excerpts from which will be provided during the results. Through providing excerpts from the reflexive journal within the results, it is anticipated that the researcher's perspectives, positions, values and beliefs will be made explicit, thus enhancing reflexivity.

8.13 Conclusion

This chapter has provided an overview of the research setting, the participants involved in this research, and how ethical issues were addressed in the present study. As has been illustrated, a number of steps were taken in an attempt to ensure that canons of good practice with regards to ethical considerations were adhered to throughout the course of this research project. In addition, this chapter has outlined the specific procedures implemented in undertaking this research study, in order to enable repeatability of this research.

CHAPTER 9

RESULTS – PHASE 1

9.0 Overview

As outlined in chapters 6–8, a 'grounded' PAR approach was identified as the most appropriate meta-methodological strategy by which to meet the aims and objectives of the present study, namely: to employ evidence-based research to develop a classroom learning environment which supports students with profound autism to engage as effective learners through:

1. Building an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs
2. Devising engagement scales sensitive to the learning profiles of students with ASDs
3. Evaluating the influence of trialled modifications on student engagement through engagement scale data triangulated with other data

This enabled the inclusion of a variety of research methods to identify elements of a suitable learning environment for this group of students. Throughout the results chapters, the phrase 'identified problem' relates to an element of the learning environment identified to require modification in order to fulfil the aim of this research.

The results of the project shall now be discussed in three phases. The present chapter shall present the findings from phase one of the project. This relates to identified problems which were resolved through modifications trialled in the first year of the project. Chapter 10 will present results from the second phase of the project: identified problems which were resolved through modifications trialled in the second year of the project, following the incorporation of the engagement scales. Finally, chapter 11 will present results from the third phase of the project: identified problems for which it was not possible to trial practical modifications within the research classroom for financial or logistical reasons, but which nonetheless represented important issues requiring consideration when developing a learning environment which supports students with profound autism to engage as effective learners. Where possible, theoretical

approaches to resolving these issues were identified, and potential adaptations for the new build were discussed with the research school.

9.1 Results

The response rates for the different data collection techniques shall briefly be summarised prior to discussing the results from phase 1 of this research.

9.1.1 Interviews

Interviews were undertaken with a total of 15 teachers at the school. Of these, 12 were class teachers, one was a teacher covering for a teacher on long-term sick leave, one was a senior teaching assistant who was also covering for a teacher on sick leave, and one was a teacher who provided non-contact cover for the class teachers. Table 9.1 shows a brief overview of the classes discussed in the 15 interviews.

Interview	Student Age (yrs)	Key Stage	No. of students	No. of staff
T1	14-17	4 and 5	5	4
T2	9-11	2	3	3
T3	16-18	5	7	4
T4	12-14	3	5	4
T5	12-15	3 and 4	6	6
T6	17-19	5	5	4
T7	11-14	3	5	4
T8	15-18	4 and 5	5	4
T9	10-12	2 and 3	3	4
T10	15-17	4 and 5	3	5
T11	13-16	3 and 4	5	4
T12	14-16	4	3	4
T13	7-16	2, 3 and 4	N/A	N/A
T14	15-18	4 and 5	4	3
T15	16-17	5	4	3

Table 9.1: The classes discussed in the teacher interviews

9.1.2 Questionnaires

From the 96 questionnaires sent out, 28 responses were received in total. These consisted of:

Department	No. of Responses received	No. of questionnaires sent out	% response rate
Deputy Head Teachers	1	3	33
Assessment and Outreach Service	2	6	33
Speech and Language Therapy	4	4	100
Occupational Therapy	1	2	50
Play Therapy	0	2	0
Psychology	2	9	22
Teaching Assistants	11	42	26
Care Team Leaders and Deputies	7	22	32
Parents	0	6	0

Table 9.2: Questionnaire responses

The mean response rate across school staff was 31%. Since questionnaires are known to suffer from a poor response rate as low as 20%, (Denscombe, 2007), this was not entirely unexpected. The key group from whom no responses were received were the parents of the students in the research classroom. The absence of feedback from parents is particularly significant, since parental involvement in the education of students with special educational needs has been found to be highly important (as discussed in section 8.2.2). For this reason parents were approached on three separate occasions to provide feedback for the study, however they consistently declined. The lack of participation from parents shall be considered in more detail during the discussion in chapter 12.

9.1.3 Follow-Up Interviews

A total of 4 questionnaire respondents were approached and agreed to participate in follow-up interviews. An overview of the respondents selected for follow-up interview is presented in Table 9.3 below.

Follow-up Interview	Role
FI1	Speech and Language Therapist
FI2	Teaching Assistant
FI3	Assessment and Outreach Worker
FI4	Speech and Language Therapist

Table 9.3: Follow-up interview respondents

9.1.4 Teacher Feedback

Out of the 15 teachers at the school, a total of 10 teachers participated in teacher-feedback sessions regarding bespoke furniture introduced into the research classroom (which will be discussed in detail during the relevant sections in chapter 10).

9.2 Data Analysis

The data analysis shall briefly be summarised prior to discussing the results from phase 1 of this research.

9.2.1 Observation Data Analysis

A sample section of the observation schedule which was collated to analyse the researcher's field notes and the teaching staff's log of student behaviour is included in Appendix 7.

9.2.2 Grounded Theory Analysis

Responses from interviews, questionnaires, follow-up interviews and teacher feedback were analysed through the grounded theory process outlined in section 8.11.3. The initial, focused and theoretical codes arising from this are provided in Appendix 6 and will be discussed within the relevant sections of the results. In the subsequent chapters, where a code is mentioned in the text, it is written in *italics* and the number of respondents who made comments relating to that code is indicated by a number in brackets beside the code. For example, *having easily accessible outdoor areas for outdoor exercise (10)* is a code which contains 10 references by respondents to the importance of students having an easily accessible outdoor area adjoining the classroom to facilitate exercising, while the code *'students needing a quiet space to calm down when anxious (25)*, contains 25 references to respondents indentifying that students need a chill-out room adjoining the classroom in which to calm down when anxious. The greater the number of references within a single code, the greater the 'density' of that code. While the density of a code is not necessarily an indication of its importance, dense codes are noteworthy given that they indicate ideas, actions, or processes which are recurring relatively frequently within the overall data set. The theory which emerged shall be discussed at the conclusion of chapter 11.

9.2.3 Engagement Scale Data Analysis

Tabulated accounts of the engagement scale data collected can be found in Appendices 9.1 – 9.4. The number of instances of each level of engagement recorded in each session were counted and calculated as a percentage of the total observations in the session in order to compare results across different sessions, students and activities. Descriptive statistics and graphical summaries shall be presented within the relevant modifications discussed during chapter 10.

9.3 Overview of Problems Identified with the Learning Environment

An overview of the problems identified throughout this research are outlined below in Table 9.4, alongside the data collection process(es) which identified each problem, the methodology utilised to determine a resolution to the problem and evaluate the resolution, and the phase of the research within which the problem fell.

Problem Identified	Identification Data Collection Method(s)	Resolution Methodology	Evaluation Methodology	Phase
Chair upholstery	Classroom Observations	Practical	Classroom Observations	1
Toilet facilities	Classroom Observations; Interviews; Questionnaires	Practical and Theoretical	Classroom Observations	1 + 3
Artificial Lighting	Classroom Observations; Interviews; Questionnaires; Sensory profiles	Practical and Theoretical	Classroom Observations	1 + 3
Laminate	Classroom Observations; Sensory profiles	Practical	Classroom Observations	1
Group / 1:1 Work tables	Classroom Observations; Interviews; Questionnaires; Sensory profiles; Engagement Scale Data	Practical	Classroom Observations; Teacher feedback; Engagement Scale Data	1 + 2
Independent Workstations	Classroom Observations; Interviews; Questionnaires; Sensory profiles	Practical	Classroom Observations; Teacher Feedback; Engagement Scale Data	1 + 2

Problem Identified	Identification Data Collection Method(s)	Resolution Methodology	Evaluation Methodology	Phase
Rocking Chairs and other sensory equipment	Classroom Observations; Sensory profiles Interviews; Questionnaires	Practical and Theoretical	Classroom Observations	1 + 3
Equipment and opportunities for physical exercise	Classroom Observations; Interviews; Questionnaires	Practical and Theoretical	Classroom Observations	1 + 3
Work Chairs	Classroom Observations; Interviews; Questionnaires;	Practical	Classroom Observations; Engagement Scale Data	1 + 2
Flooring and other considerations to improve classroom acoustics	Classroom Observations; Interviews; Questionnaires; Sensory profiles	Practical	Classroom Observations; Engagement Scale Data	2 + 3
Classroom structure	Classroom Observations; Interviews; Questionnaires	Practical	Classroom Observations	2
Chill out room	Classroom Observations; Interviews; Questionnaires	Practical and Theoretical	Classroom Observations; Teacher Feedback	2 + 3
Interactive Whiteboard	Classroom Observations; Interviews; Questionnaires; Engagement Scale Data	Practical	Classroom Observations; Engagement Scale Data	2
Intensive Interaction	Classroom Observations; Interviews; Questionnaires; Engagement Scale Data	Practical	Classroom Observations; Engagement Scale Data	2
Storage	Classroom Observations; Interviews; Questionnaires	Theoretical		3
Room Temperature	Interviews; Questionnaires	Theoretical		3
Distraction from sunlight	Interviews; Questionnaires	Theoretical		3

Problem Identified	Identification Data Collection Method(s)	Resolution Methodology	Evaluation Methodology	Phase
Distraction from window views	Interviews; Questionnaires	Theoretical		3
Ventilation	Interviews; Questionnaires	Theoretical		3
Natural Lighting	Interviews; Questionnaires	Theoretical		3
Screens	Interviews; Questionnaires	Theoretical		3
Storage	Interviews; Questionnaires	Theoretical		3
Classroom size	Interviews; Questionnaires	Theoretical		3
Computer Storage	Classroom Observations; Interviews; Questionnaires	Theoretical		3
Kitchen Area	Classroom Observations; Interviews; Questionnaires	Theoretical		3
'Circulation Space' Corridors	Interviews; Questionnaires;	Theoretical		3
Curvilinear walls	Literature Review;	Theoretical		3
Security	Interviews; Questionnaires	Theoretical		3
The staff	Interviews; Questionnaires	Theoretical		3
The students	Interviews; Questionnaires	Theoretical		3
The teaching approach and resources	Interviews; Questionnaires	Theoretical		3

Table 9.4: Identified problems with the learning environment

9.4 Phase 1 Results

The findings of the first year of the PAR phase of the research shall now be discussed.

9.4.1 Chair Upholstery

Identifying the problem:

Classroom Observations

Classroom observations revealed that the chair upholstery used to cover the soft classroom chairs was not sufficiently robust. Students were repeatedly observed to bite

through the existing upholstery and rip sections off it. In addition to the issue of robustness, further discussions with the classroom staff identified three additional requirements to consider when selecting upholstery for use within a classroom for students with ASDs. Firstly, they emphasised that it was essential for the fabrics to be waterproof, so that the chairs could be easily cleaned should the students have any toileting or other accidents on the chairs. Secondly, they felt that modifications to the environment should promote neutral, muted colours. Thirdly, the teaching staff also felt that solid colour materials would be preferable to patterned ones.

Interviews & Questionnaires

Whilst not specifically discussing upholstery, interview and questionnaire respondents discussed generally the importance of *furniture being robust (8)* and *flooring needing to be durable (4).* With direct reference to upholstery, respondents commented about *upholstery needing to be waterproof / washable / easily cleaned (2)* and *upholstery needing to be robust (1).* For example, one teacher remarked that:

"X again, … he'd bite it and then just spend his day twiddling the strands. So this is another aspect you've got to think of. Children who will destroy that because it's soft material" (T11)

With regards to the need for waterproof materials, one teacher commented:

"We have cushions and things to sit on, but again, the students in this class are not fully toilet trained and things and we have lots of accidents and that's the problem when you've got cushions and bean bags and stuff, to try and get them washed." (T5)

In addition, they highlighted the importance of *using the right colours (14)* and *using plain / solid colour finishes (1).* For example, they commented that:

"With the colour schemes, you know that our students need to have sort of more muted colours, nothing too bright and garish." (T8)

and:

Everything is just newly decorated so it's all plain and lovely, and it's made such a difference. (T15)

Memoing

MEMO (Chair Upholstery)

As anticipated from the literature review, this identified problem raises issues relating to the need to adapt the learning environment to accommodate the sensory processing difficulties experienced by individuals with autism (through using neutral solid colour). It is anticipated that this will reduce sensory overload and assist the students in remaining calm and thus able to engage in learning. However, in addition, the issues raised by this identified problem would also seem to suggest that when developing a learning environment suitable for students with ASDs, it will also be important to address issues relating to the need for:

a) robust furniture and furnishings which can withstand abuse from challenging behaviour, and,
b) furniture and furnishings which can be easily cleaned or washed should the students have toileting accidents

Clearly whilst such issues may not initially appear to directly relate to learning, providing an environment which is 'fit for purpose', hygienic and aesthetically pleasant is nevertheless important in order to provide a suitable teaching and learning environment for both the staff and students.

Planning:

The importance of employing "serviceable and hardwearing materials" within buildings designed for individuals with autism has been highlighted by both the Department of Health (2006, p. 43) and Simon Humphreys, an architect with a particular interest in autism (published within King & Harker, 2002, p. 94). Humphreys goes on to qualify that "people with autism can be deliberately or accidentally heavy on materials and equipment." In addition, the importance of utilising materials which are "water-resistant, washable" is highlighted by the NAS (Nguyen, 2006, p. 13). However, at present there is an absence of research and advice surrounding the most appropriate materials to use in environments designed for individuals who require hardwearing and waterproof furnishings.

With regards to colour and patterning, the DfES (2002b, p. 36) suggest that "the use of yellow, beige or off-white surface colours can stimulate learning while light blue, green and lavender can be calming, but some vibrant colours can over-excite and have a negative effect on learning." In addition, research has shown that "bright colours can be … stressful to children and young people with ASD" (Connor, 2007). This was also a view supported by two directors of autism facilities, who outlined that "a muted, subdued palette — pastels, neutral beiges and browns … [and] plain unpatterned

finishes are sensible choices for schools for autistic children" (quoted in Myler, Fantacone & Merritt, 2003). In addition, Donna Williams, an autistic lady writes that "the sensory overload caused by … colours and patterns makes the body react as if being attacked or bombarded, resulting in such physical symptoms as headaches, anxiety, panic attacks or aggression" (quoted in Lawson, 2007, p. 9).

The NAS also discusses the issues of colour and patterning, outlining that "it is generally accepted that low arousal colours such as cream … should be used for walls … [and] you should also keep soft furnishings fairly plain [and] single-colour" (Nguyen, 2006, p. 12). In addition, Kip Farmer (n.d.), an interior designer specialising in environments for individuals with autism reiterates these views, stating that:

> *"A monochromatic colour scheme in a room instantly produces a peaceful atmosphere, inviting downtime for an anxious child or adult. 'Cool' colours such as blue or green give the most soothing effect … selecting solid fabrics and floor coverings for your space keeps eyes from fixating on distracting, complex patterns."*

It therefore seems clear that in order to accommodate the sensory processing difficulties frequently experienced by individuals with autism (as discussed in sections 3.2.3 and 3.2.4), and provide a learning environment which enables students with autism to maintain a calm emotional state essential for effective learning (see section 5.1.1), consideration of the colours and patterns utilised within the environment is crucial. Furthermore, the needs of individuals with autism also predicate that consideration should be given to issues such as robustness and clean-ability.

Action Step:

Based on this information, alternative upholsteries meeting the criteria of robustness, clean-ability, and neutral solid colour were researched. Two suitable alternatives were identified, and a selection of chairs were reupholstered in both fabrics.

Evaluation:

Unfortunately, an evaluation of the new upholstery through further classroom observations quickly revealed that the new upholstery was not an improvement on the original, since the students continued to bite through the new upholstery and peel sections off. An example of this can be seen in Figure 9.1 below.

Figure 9.1: Torn soft chair upholstery

Nevertheless, classroom observations and staff feedback confirmed that when selecting upholstery for use within a classroom for students with ASDs:

1. The fabric must be sufficiently robust to withstand biting, ripping and tearing
2. The fabric must be waterproof and easily cleaned
3. A muted, neutral and solid colour design is beneficial to promote a calmer, less distracting and low arousal environment within the classroom since this is more conducive to effective student engagement and learning

Planning:

The reflective nature of the PAR approach employed meant that although the initial upholstery modification was unsuccessful, these key points could subsequently be utilised to inform the choice of an alternative upholstery for the soft chairs in the classroom. Consequently, research was once again undertaken to find a more robust alternative which also met the criteria of being waterproof and a muted, solid colour. A fabric called ballistic nylon, which is normally utilised as the bullet-proof barrier within bullet-proof vests was identified as a possible alternative since it was anticipated that the students would not be able to bite through a fabric which a bullet could not penetrate. Unfortunately however, it was not possible to trial this fabric due to the fact that ballistic nylon had never previously been used as upholstery within an educational setting, and thus it did not have the required fire safety test certificates. Nevertheless, following further discussions with a local upholsterer, other alternative fabrics were identified.

Action Step:

The soft classroom chairs were once again reupholstered, using a fabric which was advertised for contract upholstery but nevertheless had a pleasant faux-suede feel, and met the cleaning, colour and pattern requirements discussed above.

Evaluation:

An evaluation of this second upholstery showed that it was a vast improvement on the previous two fabrics trialled. Classroom observations revealed that the students were no longer biting through the fabric and ripping it off the chairs.

A pictorial overview of the upholstery modifications trialled through this PAR spiral can be seen in Figure 9.2.

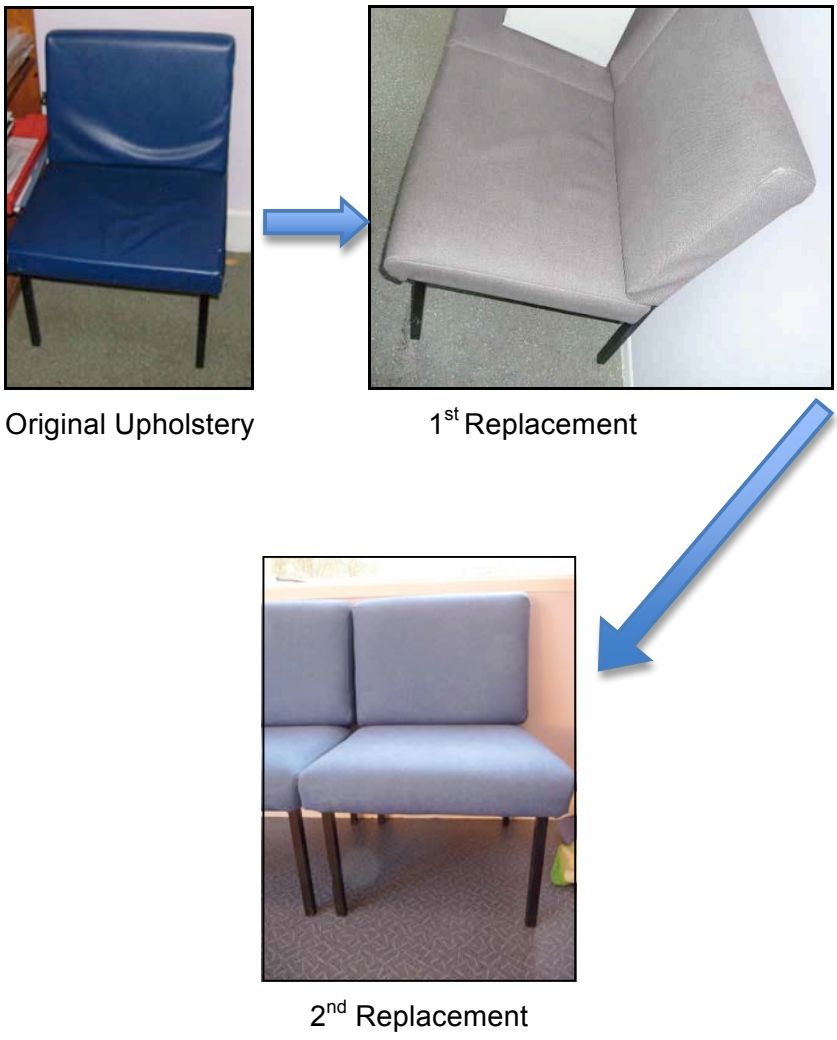


Figure 9.2: Upholstery fabrics trialled

Reflexive Journal Excerpt

. . .This problem is interesting. It seems to me that there are two possible routes to resolving the issue of the students biting through the chair upholstery: a) find more robust upholstery; b) explore the provision of sensory equipment such as chew tubes for the students to bite down on rather than biting the furniture. As a team we have decided to explore the first option in order to provide long-term benefits in terms of the quality and durability of the furnishings in the new school. Nevertheless, I have also arranged to discuss the issue with the occupational therapist at the school in order to get advice from a therapeutic perspective. However, it will be important not to introduce any alternative sensory equipment until suitable robust upholstery has been identified, as this would likely influence the findings. Having a team of co-researchers is proving beneficial in order to provide a forum to deliberate multiple perspectives and enable collaboration to identify the most effective way to fulfil the aims of the project. . .

9.4.2 Toilet Facilities

Identifying the Problem:

Classroom Observations

In addition to damaging the chair upholstery, it was also observed that students frequently damaged the toilet / toilet area / sink when utilising these facilities, especially if they became agitated. Consequently maintenance staff were frequently being requested to replace the toilet and sink.

Interviews & Questionnaires

The prevalence of toileting issues and therefore damage to toilet facilities was also raised by other staff, who highlighted the importance of *toilets needing to be robust (2).* For example, one teacher commented that:

"A lot of the students have problems with their bowels, and if they're about to go to the toilet, or they've just been to the toilet they might be in pain … we need bathrooms that are appropriate so the kids can't break the toilet systems and things" (T5)

Memoing

MEMO (Toilet facilities)

As with the chair upholstery 'problem', toilet facilities does not initially appear directly relevant to the development of an appropriate learning environment. However, even at this early stage in the research process, it seems clear that toileting issues as a result of interoceptive dysfunction are prevalent amongst these students and have a significant impact upon the school day and the suitability of the learning environment. Consequently, providing suitable toileting facilities will clearly be important to ensure that toileting causes as little disruption as possible to the school day, enabling engagement in learning opportunities to be maximised.

Planning:

The prevalence of toileting issues for individuals with autism is widely documented (Dalrymple & Ruble, 1992). Indeed “individuals with autism have been reported by researchers as being the most difficult population to toilet train” (Wheeler, 2004, p. 3). Consequently, to date a number of different possible reasons for this have been suggested, including communication difficulties, sensory issues resulting from interoceptive dysfnction, poor motor skills and lack of understanding, and a variety of strategies have been suggested to help individuals with autism overcome their toileting difficulties (Kroeger & Sorensen-Burnworth, 2009; Wheeler, 2004). Nevertheless, a recurrent consequence of these issues is that they “can result in increased levels of anxiety, frustration and confusion related to toilet training. These feelings are often expressed in the form of misbehaviours” (Wheeler, 2004, p. 4). Clearly therefore there is a strong requirement for suitably robust toileting facilities.

However, whilst the requirement for accessible design for bathroom and toilet areas is now widely accepted, and all new builds must provide wheelchair-accessible facilities in order to comply with the 1995 Disability Discrimination Act, research investigating other aspects of toilet and bathroom design for individuals whose needs are not solely physical is at present lacking. Nevertheless, Harker & King (2002, p. 100) do recommend that “WCs able to withstand heavy use, option of a concealed cistern” are important considerations when designing toileting facilities for individuals with special needs. In addition, the NAS suggests that “it may be helpful to have the toilet cistern hidden behind a wall” (Nguyen, 2006, p. 13). It is therefore clear that as for the upholstery, the needs of individuals with autism predicate that the environment must be suitably robust. Based on this information, the maintenance staff at the research school were asked to create a ‘boxed-in’ design to conceal the cistern and sink and thereby limit damage to the toilet facilities.

Action Step:

The toilet facilities in the research classroom were adapted to be more robust by having them ‘boxed-in’. Figure 9.3 below shows this ‘boxed-in’ design.

Figure 9.3: 'Boxed-in' toilet facilities

Evaluation:

Following the introduction of the 'boxed-in' toilet facilities, the students were not observed to do any further damage to the toilet or sink. This 'boxed-in' design was subsequently utilised within the new school. Pictures of the toilets within the new school can be seen below.

Figure 9.4: 'Boxed-in' toilets in the new school

A number of additional issues were also raised by interview and questionnaire respondents with regards to toilet and washing facilities. Since it was not possible to trial modifications to address these issues they will be discussed in chapter 11.

9.4.3 Artificial Lighting

Identifying the Problem:

Classroom Observations

Classroom observations identified:

- Students turning the lights off when stressed, anxious, tired or unwell
- Students hand flapping in front of their eyes when positioned in front of the lights
- Students choosing to spend the majority of their choice time by windows where natural light is prevalent (see Figure 9.5)
- Students struggling to see their work and squinting due to glare and reflection from the lighting

Figure 9.5: Student spending choice time by the windows

Hand flapping is an example of a repetitive self-stimulatory behaviour, which as highlighted in sections 3.2.4 and 5.1.1, it is now recognised many individuals with autism use to assist with sensory overload. When combined with the students turning the lights off, avoiding facing the lights, and squinting, this would seem to suggest that the lighting was a source of discomfort for the students and exacerbated their sensory processing and regulatory difficulties.

Sensory Profiles

Information acquired from the sensory profiles obtained for 4 of the 5 students in the research classroom during the first phase of the project also suggested that lighting may be an important factor to consider in the development of an appropriate learning environment for these students. Three of the profiles identified a 'probable difference' with regard to visual sensitivity, and one profile identified a 'definite difference'. The profiles state that "children who are sensitive to visual stimuli may make attempts to limit this input." This would correlate with students turning the lights off and choosing to spend time by the windows.

Interviews & Questionnaires

These observations were further supported by the interview and questionnaire respondents who provided extensive feedback regarding *artificial lighting affecting students (24)* and *reflection of light affecting students (3).* For example, one teacher commented that:

"The lighting is not satisfactory. The other room in there I couldn't turn the light on at all because I had a student who was sensitive to light … I know people are sensitive to fluorescent lighting, to this kind of lighting." (T11)

Memoing

MEMO (Artificial Lighting)

From the density of the code for *"artificial lighting affecting students"* it seems clear that the students' sensory sensitivities make consideration of lighting in the classroom highly important. This strongly supports the conclusions from the literature review which suggested that it would be important to consider sensory aspects of the environment in order to accommodate for the sensory processing difficulties experienced by individuals with autism. Eliminating sensory distractions and irritants caused by artificial lighting will hopefully reduce sensory overload and thereby assist the students to engage as effective learners.

Planning:

As briefly mentioned in chapter 5, "classroom lighting is often a problem for students with autism. Some report that it is annoying, distracting, and even painful" (Kluth, 2004, p. 43). Traditional fluorescent strip lighting which utilises a magnetic ballast, creates a flicker and hum and causes glare, all of which may "cause discomfort and distractability" and be detrimental to students' wellbeing and engagement (Erwine, 2006, p. 25). Henry (2006, p. 10) states that "florescent lighting, compared to

incandescent lighting, has been known to be very painful for people along the spectrum because of their noise and flickering."

This view is reiterated by the NAS, who highlight that "fluorescent or harsh lighting can hurt the eyes of a person with autism. Many say that they can see these types of lights flickering or hear them hum, which can be very distracting, possibly even painful" (Nguyen, 2006, p. 10). Erwine (2006, p. 25) also supports this view, stating that "the hum from magnetic ballasts and the glare from poorly designed lighting can also be problematic for children with autism, sometimes causing painful distractions." Bogdashina (2003) reaffirms this, highlighting that students with autism who have auditory hypersensitivity may be unable to tune out the high frequency hum, thus creating an annoyance and distraction.

In addition to these problems, the direct illumination from a traditional fluorescent strip light also "creates glare and causes visual discomfort, fatigue, or even the inability to see at all" (Erwine, 2006, p. 27). Studies have shown that the extent of glare in a classroom correlates with reduced student learning and performance (California Energy Commission, 2003; Heschong Mahone Group, 1999). Modern fluorescent light fittings offer the opportunity to utilise louvers, which "provide superior glare control and high visual comfort" (Wood, 2004, p. 45). This contrasts dramatically with traditional fluorescent strip lights, which "are those without any shielding mechanism … they provide the lowest level of visual comfort" (Wood, 2004, p. 45).

First-hand accounts from individuals with autism provide fascinating insights into the challenges of fluorescent lighting. According to Bogdashina (2003, p. 63), "fluorescent light has been reported by many autistic individuals to be very difficult to tolerate." Dumortier reveals that fluorescent strip lights "are too much for me and give me a splitting headache or make me feel nauseous, or sometimes both" (Dumortier, 2004, p. 33). It is thus generally recommended that such negative environmental stimuli should be avoided where possible (Thompson, 1999). As Erwine (2006, p. 26) succinctly puts it, "all of these health concerns indicate the need to change from magnetic to electronic ballasts to eliminate flicker and buzz."

In addition to the issues surrounding traditional fluorescent lighting fixtures, recent research investigating the impact of artificial lighting on learning has also found that

when high colour temperature fluorescent lights, also known as daylight fluorescents, are used, students show an improvement in tasks requiring small, precise vision (Berman, Fein, Jewett, Benson, Law & Myers, 1996; Berman, Fein, Jewett, Law & Myers, 1996). This view is advocated by the DfES (2002b, p. 36), who state that "wide-spectrum high frequency fluorescent lighting is preferable to low frequency (50Hz) fluorescent lighting." Myler et al.(2003) also promote the use of full-spectrum[5] fluorescent light, stating that "full-spectrum lighting is preferred in an autism education facility." This view was also supported by staff working within a residential home designed specifically to meet the needs of children with autism, where daylight spectrum lighting was installed (Whitehurst, 2006a).

Follow-up discussions with the care staff of this new residential home by the current researcher revealed that staff attributed reduced glare and a general calmer atmosphere within the house to the new lighting. Furthermore, staff also stated that the children living there no longer stared intensely at the lights, which they had previously done frequently with the old lighting. This observation is indicative that the students were sensitive to the old fluorescent lighting, since as outlined by Myler at al. (2003) "the flickering [of traditional fluorescent strip lights] can be distracting and even harmful to individuals with autism. Some autistic children can lock their gaze onto a fluorescent fixture." The literature and evidence discussed thus indicates that the flicker, hum, glare and unnatural colour spectrum of traditional fluorescent lights exacerbates the sensory processing difficulties experienced by individuals with autism discussed in chapter 3, thus hindering their engagement in learning.

Action Step:

The decision was thus made to replace the traditional fluorescent strip lighting in the research classroom with modern electronic ballast daylight spectrum fluorescent lighting. In an ideal world non-fluorescent lighting would be used however "non-fluorescent lighting uses considerably more energy, and an operations budget may not be able to absorb this long-term expense" (Myler et al., 2003) and thus due to the financial and energy requirements of the school, this was not a feasible option. Nevertheless, the modern fittings benefit from great technological advances, and no longer exhibit the hum and flicker associated with traditional fluorescent lighting

[5] "Full spectrum is an imprecisely defined term that usually refers to a fluorescent lamp that simulates the spectrum of daylight" (Erwine, 2006).

(Erwine, 2006). In addition, with the incorporation of louvers to prevent glare, and a tube emitting a daylight spectrum light, it was possible to address all of the issues identified with the traditional fluorescent strip lighting.

Evaluation:

An overview of the differences between the traditional and modern fluorescent lighting installed in the research classroom is shown in Table 9.5 below. Photographs are presented in Figure 9.6.

Light Feature	Traditional Fluorescent Strip Lighting	Modern Daylight Fluorescent Lighting
Ballasts / Flicker / Hum	Magnetic / Yes / Yes	Electronic / No / No
Colour spectrum	Unnatural	Natural
Louvers to prevent glare	No	Yes

Table 9.5: Differences between traditional and modern fluorescent lighting

Classroom observations following the installation of the new lighting revealed that:

- The students noticed the change. On their first day in the classroom with the new lights, they were staring at the lights, and turning the lights on and off. Notably they always left the lights on not off
- A verbal student with autism who visited the classroom commented that the lights had changed and said that he liked the new lighting
- The students no longer exhibited excessive hand flapping when facing the lights
- The students were less insistent on spending choice time by the windows
- Although improved, students were still struggling to see resources due to glare and reflection from the lights

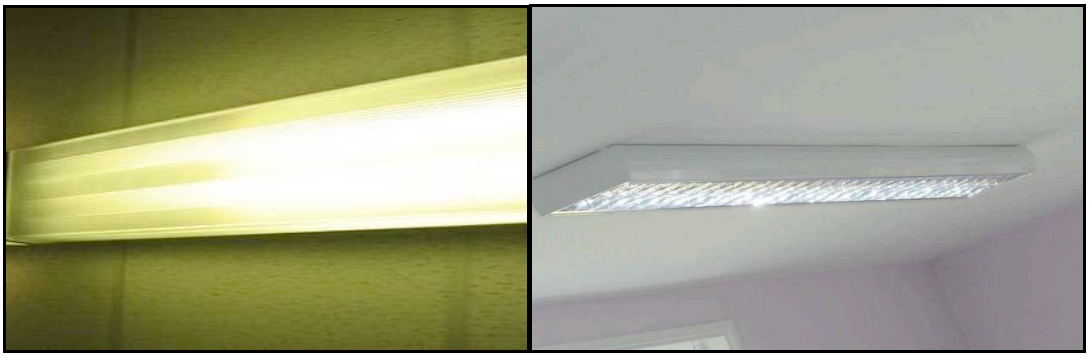


Figure 9.6: Traditional and modern fluorescent lighting

Although many of the problems associated with traditional fluorescent strip lighting appeared to be resolved by installing the modern fluorescent lighting, reflection and glare continued to be a problem. In addition to this, other issues relating to indoor lighting were also raised during the interviews and questionnaires. Since it was not possible to trial practical resolutions to these additional issues, they will be discussed in greater detail during the findings of phase 3 in chapter 11.

Nevertheless, due to the success of the modern fluorescent lighting, this was chosen as a suitable lighting for the new school. A picture of the modern fluorescent lighting installed in the new school can be seen below.

Figure 9.7: Modern fluorescent lighting installed in the new school

Reflexive Journal Excerpt

. . .I have had previous personal experience of fluorescent lighting having a negative impact on children with autism. As such I am strongly averse to fluorescent lighting within environments for individuals with autism. Writing this however has made me extremely aware of my bias, and thus will hopefully enable me to be cautious and aware of my natural bias in interpreting the findings and identifying possible modifications. . .

. . . Due to my instinctive bias I made a conscientious effort to be open-minded through this research spiral. This has been crucially important in successfully identifying a suitable alternative to the traditional fluorescent lighting in the research classroom. I had initially assumed that the most suitable option would be incandescent lighting. However, it is not possible to install this lighting extensively within schools due to the amount of energy they consume and the resulting financial costs. I therefore arranged to have a detailed discussion with a lighting designer, to learn about the differences between traditional fluorescent lighting and the new modern fittings. Through learning about the differences between modern and traditional fluorescent lighting I have come to understand that the modern fittings benefit from different technology which does not emit the hum or flicker so painful and distracting to many individuals with autism, and also have louvers which reduce glare. With this knowledge I was able to assess the trialling of this intervention from a neutral stance. . .

9.4.4 Laminate

Identifying the Problem:

Classroom Observations

Classroom observations indicated that the glare issue arising form the lighting was being compounded by the glossy laminate being used to cover the students' resources since the glossy finish was creating glare and reflection which was hindering the students' engagement in learning. Examples of the classroom observations included:

- Reflection from the lighting on the glossy laminate hindering students' ability to see their work
- Glare causing students to squint when looking at resources
- Glare reducing students' independence in activities since staff have to reposition work to reduce glare

These observations thus suggested that the glare arising from the glossy laminate may be aggravating the sensory processing difficulties common in autism (as discussed in chapter 3), and thus hindering their ability to engage in learning.

Sensory Profiles

As discussed in the previous section, all the students' sensory profiles identified visual sensitivities. This information thus provided further indication that glossy laminate may be detrimental to the students' engagement in learning due to their sensory processing difficulties.

Interviews & Questionnaires

The interview and questionnaire respondents also identified the issue of glossy laminate, with respondents discussing *using / wanting to use matt laminate (4)*:

"Matt laminate, I can not say strongly enough, how much our children need matt laminate. It just makes life so much really more meaningful for them, there isn't any glare, they don't flick at it so much, it doesn't make that nice resounding crack, and all the images are much clearer, it's an absolute must, and within speech therapy we use as much matt laminate as we possibly can." (FI1)

Memoing

MEMO (Laminate)

The difficulties of reflection and glare which were previously associated with the traditional fluorescent light fixings continue to be an issue within the classroom even now that the modern lighting is in place. It seems clear from classroom observations and respondents' comments that glossy surfaces and finishes exacerbate visual processing difficulties and are hindering the students' engagement in learning. Since a vast proportion of the students' resources are covered in glossy laminate, this has a continuous impact upon the students' abilities to engage with the resources presented to them. Clearly to optimise the students' engagement in learning reducing reflection and glare is an important consideration.

Planning:

Research has found that there are many behavioural similarities between children with autism and those with visual impairments (VI) (Brown, Hobson & Lee, 1997; Cass, 1996; Cass, 1998). Gense & Gense (2005, p. 22) state that:

> *"Confusions concerning visual impairments and autism spectrum disorders have been sometimes fuelled by the appearance of similar behaviours in children who are congenitally blind and children who have an autism spectrum disorder."*

Many first-hand accounts from individuals with autism reiterate that one of the main problems they experience is their abnormal visual perception (Gerland, 2003; Grandin, 2006; Holliday-Willey, 1999; Lawson, 2000; Williams, 1994). Bogdashina (2003, p. 27)

thus concludes that “one might assume autism means there are distortions of visual … information about the world.”

Guidelines provided by the Royal National Institute for the Blind (RNIB) highlight that for individuals with VI, “a matt surface is recommended. Glossy paper can be difficult to read for people with sight problems as it reflects too much light” (RNIB, 1999, p. 7). Furthermore, as discussed above, glare has been shown to dramatically reduce learning for all students (California Energy Commission, 2003; Heschong Mahone Group, 1999). The literature and evidence discussed thus suggested that as a result of their sensory processing difficulties, individuals with autism (like those with VI) may struggle with glossy and reflective surfaces, and that it is important to consider the need to reduce glare within the environment for students with ASDs.

Action Step:

The documented similarities between autism and VI provided sound justification to utilise the advice provided by the RNIB in an attempt to address the problems associated with using glossy laminate. Consequently, matt laminate was introduced to cover the students’ resources instead of glossy laminate. Photographs of the glossy and matt laminate can be seen in Figure 9.8 below.

Evaluation:

Classroom observations and staff feedback following the introduction of the matt laminate revealed that this modification was successful since:

- Reflections on the students’ work were noticeably reduced
- Students were looking at and engaging better in activities

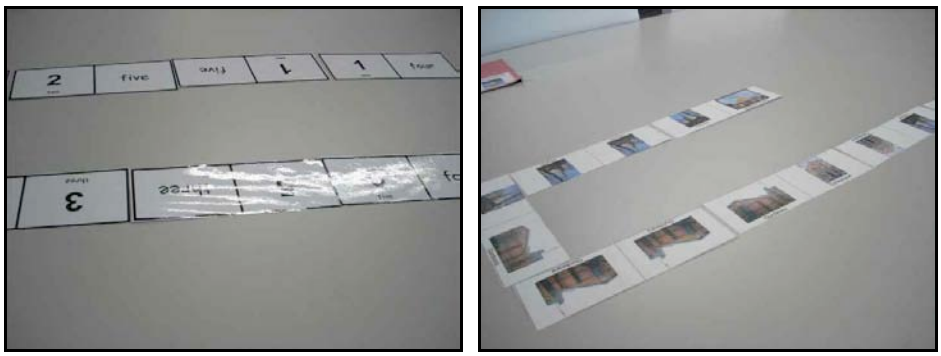


Figure 9.8: Glossy and Matt laminate

9.4.5 Group / 1:1 Work Tables

Identifying the Problem:

Classroom Observations

Classroom observations of the group / 1:1 work tables identified a number of issues:

- As with the laminate, reflection from the lighting was exacerbated by the glossy finish on the tables, which caused glare and hindered students' ability to engage in learning
- The glossy finish was also a source of distraction, and exacerbated self-stimulatory behaviours, with one student getting sensory input from wetting and rubbing the table
- The tables were too light and easily moved, tipped or thrown by the students, which created a health and safety risk, as well as requiring staff to constantly realign the tables
- Students frequently banged on the tables, possibly due to the sensory feedback from the loud noise and tactile sensations this produced. However this was both distracting and distressing for other students in the class due to their auditory sensitivities
- The brown colour dominated the room and created an 'unfriendly' atmosphere

Sensory Profiles

Information acquired from the sensory profiles obtained for 4 of the 5 students in the research classroom during the first phase of the project revealed that one of the students' profiles identified a 'definite difference' with regard to their sensitivity to movement input. The profiles state that "children who are sensitive to movement input may be insecure and uncomfortable with movement, particularly that which is unpredictable, and react negatively to any suggestion of movement." This student appeared disinclined to move around the classroom, and staff commented that the student tended to keep a wide berth when walking by the edges of the table. It was thus considered that curvilinear design may be an important factor in the development of an appropriate learning environment for these students in order reduce anxiety and promote ease of movement around the classroom.

Planning:

In response to these observations, a new class table was identified. This furniture, called Leca, was specifically designed to support the needs of students with Aspergers' syndrome (Burn, 2005), and thus it was anticipated that it may be beneficial for the students at this school. The furniture provided each child with a 'personal domain' in which to work, whilst at the same time providing space for group work at a central circular table (Burn, 2005; see figure 9.10). "Unique to Leca is the linked personal and sharing area which encourages collaborative activity and engagement with others" (Burn, 2005, p. 7).

Based on Temple Grandin's squeeze machine (Grandin & Johnson, 2005; Grandin, 1992), the Leca furniture was designed to provide the enclosed space often preferred by those on the autistic spectrum as a result of their vestibular (the sense responsible for perceiving the body's orientation) and proprioceptive (the sense that provides feedback on the status of the body) dysfunction. In addition to this, by designing furniture which encircles the child, Burn hoped to create an illusion of deep pressure, a sensation often craved by those on the spectrum due to tactile sensitivities (Bogdashina, 2003). "The narrow entrance/egress point and enclosed panels surrounding the sharing and personal space add to a sense of 'containment' and modify disruptive behaviour" (Burn, 2005, p. 7).

The furniture also incorporated a curvilinear design, a concept which originated from the work of Rudolf Steiner (1919) with each personal domain designed using Steiner's philosophy to follow 'natural rhythms' and curve naturally around the student. Steiner founded Waldorf Education, an approach based on his educational philosophy and spiritual philosophy anthroposophy, which is a holistic and child-centred approach to teaching which emphasises educating the whole child. As such it recognises the importance of both the approach to teaching and also the design of the classrooms. Steiner believed that classrooms should derive from the nature of the activities taking place in them, such that they support the educational learning and human development that is intended. Steiner imagined every classroom to be "shaped by an artist in such a way that each single form is in harmony with what his [the child's] eye should fall upon when the child is learning" (Steiner, 1919).

More recently, Whitehurst (2006b, p. 4) describes a new residential living accommodation designed for children with profound autism, where curvilinear walls replaced right angles in the overall shape of the building in response to observations that children were “having difficulties with right angles.” The curves were found to be successful in facilitating the children’s movement through the house, as “children often placed their hands on the walls, following contours round the corridor” (Whitehurst, 2006b, p. 4). Whitehurst attributed this to the sensory dysfunction issues experienced by many with ASDs, stating that “children with ASD experience a range of proprioceptive problems – they often have difficulties being aware of their own bodies in relation to the context in which they find themselves” (Whitehurst, 2006b, p. 4).

This is a view corroborated by the high functioning autistic woman Donna Williams, who reveals that “she had difficulty perceiving herself in relation to her environment”, and thus perimeter hugging and touching the objects in a room served to “give her security by helping her to interpret her environment” (quoted in Bogdashina, 2003, p. 26). Similarly, Beaver (2006, p. 5) advocates the use of curved walls when designing environments for individuals with ASDs, claiming that the curved walls help people with autism “to move through the building as they like to follow the curve and avoid sudden corners.” It therefore seems clear that as a result of the sensory processing difficulties experienced by individuals with autism, there are many factors which require consideration when developing suitable furniture which supports students with profound autism to engage as effective learners. These include colour (see section 9.4.1), shape (discussed above), acoustic properties (to be discussed in chapter 10) and reflectivity (see section 9.4.4). Furthermore, as highlighted during sections 9.4.1 and 9.4.2, the needs of individuals with autism also necessitate that consideration should be given to the issue of robustness.

Action Step:

Supported by the research discussed above, the Leca furniture was trialled within the research classroom. Two tables were installed, a 5 person ‘pod’ which was placed in the main classroom (shown below in Figure 9.9), and a two person ‘pod’ which was placed in the side classroom.

Figure 9.9: 5-person Leca furniture

Evaluation:

An evaluation of classroom observations and feedback from staff following the introduction of the Leca furniture found that it gave rise to a number of difficulties which affected the level of support the students were receiving as well as their levels of engagement throughout the school day. Consequently the 5 person Leca furniture was removed from the classroom after two weeks, and the 2 person pod was removed after 6 months. A summary of the main issues arising is listed below:

- The close proximity of the students increased the extent to which they were poking, spitting at, harming and generally irritating each other, with the result that they were engaging less in group activities and there was a rise in the level of minor incidents, stress and general unease in the classroom
- The absence of designated space for the teaching assistants within the framework of the table made group work confusing, chaotic and highly stressful for both the staff and students. This also reduced the level of support the students were receiving, both in terms of behaviour support and to participate in group activities, thus diminishing the students' involvement and decreasing the extent to which they benefited from the activities
- Staff commented that the bright colour of the furniture created a very visually stimulating environment, which they felt may be contributing to the increase in disruptive behaviour displayed by the students since the introduction of the new furniture
- The absence of suitable independent workstations within the furniture design meant that the students' existing workstations had to remain in the

classroom. This combined with the large overall size of the Leca furniture made the classroom increasingly claustrophobic and created problems in navigating the classroom and accessing all areas

- The large size of the furniture inhibited the staff's ability to respond appropriately to challenging behaviour since staff were unable to reach students promptly in order to make the environment safe
- The furniture was very large and inflexible, and as such could not easily be moved or modified to meet the fluctuating needs of the students
- Despite the overall size of the furniture, neither the group / 1:1 table nor the independent work spaces provided desk space large enough to support the poor motor skills of the students in order to allow them to complete work independently, nor was there space to complete larger activities such as dominoes games, art work and jigsaws
- A central removable circular disc (which functioned like a lazy susan) was a distraction to the students and raised significant health and safety concerns due to the risk of it being thrown

On a positive note, it was observed that:

- There was an improvement in the on-task behaviours and engagement of one student when he was participating in group activities during circle time, possibly as a result of his close proximity to the class teacher
- One student in particular appeared to feel extremely comfortable within his pod and chose to spend the majority of choice time reading within it. However staff also noticed that this coincided with a decrease in his interaction with others in the classroom
- Staff commented that the individual pods provided a very secure and comfortable environment, and a feeling of safety for the students
- Staff commented that the curves contributed towards a calmer atmosphere within the classroom when the furniture was not being used to full capacity, for example when only 1 or 2 students were using it
- The furniture was strong and sturdy; none of the students were able to move it
- The matt surface reduced reflection problems

- Some reduction in the sensory behaviours surrounding the table surface were perceived
- There was a large reduction in the noise made when the tables were banged, leading to an apparent reduction in banging by students and a quieter classroom

Although this intervention was not successful, it revealed a number of key issues which require consideration when designing school furniture for students with autism in order to address their sensory processing difficulties and other needs:

- Appropriate and uniform furniture - to support student engagement
- A matt finish - to reduce reflection and glare
- Curvilinear design - facilitate movement around the classroom
- Heavy, strong and sturdy tables - to prevent students from lifting them
- Space for teaching staff to be seated alongside students - to support behaviour and learning
- Flexibility in table structure and size - to ensure tables are not too large for the classroom and can be rearranged when necessary to meet students' fluctuating needs
- Sound absorbent table material – to reduce echo and noise from banging
- Muted neutral colours - to prevent overstimulation and create a calm atmosphere within the classroom

The reflective nature of the PAR approach employed meant that although the initial group / 1:1 table modification was unsuccessful, these key points could subsequently be utilised to inform the design of an alternative class table. This took place during the second phase of the PAR, and thus will be discussed in detail in the next chapter, together with additional comments regarding the group / 1:1 work table obtained from the interviews and questionnaires.

Reflexive Journal Excerpt

. . .I am feeling cautious about the Leca furniture. It seems a dramatic change from the 'standard' classroom furniture. I am particularly unsure about the colour and the absence of suitable worksystems. I know that I must be careful to be open-minded about the potential benefits of this table. I have arranged to have a learning environments team meeting 1 week after the furniture is installed to ensure that the perspectives of the whole team inform the evaluation . . .

. . .From the discussion at the team meeting today it is clear that the teaching staff in the research classroom are truly struggling with the new furniture. I made a conscientious effort to stand back and listen today, and it was clear to me that my observations of student behaviour following the introduction of the Leca furniture provide a true reflection of the difficulties being experienced. It seems clear even now that the furniture is not suitable for this group of students, however we have agreed to trial it for one more week in order to confirm and consolidate the findings. . .

9.4.6 Independent Workstation

Identifying the Problem:

Classroom Observations

As outlined in section 5.1.2, the main teaching approach utilised within the research school is TEACCH. TEACCH is an approach which places emphasis on 'structured teaching' – "a system of organising the classroom and making teaching processes and styles autism-friendly" (Mesibov & Howley, 2003, p. 9). An important aspect of TEACCH is the use of independent workstations, or "sheltered environments" (Dempsey & Foreman, 2001, p. 111) which function to assist students in completing independent tasks by reducing external distractions. According to Mesibov & Howley (2003, p. 39 & 27) "for pupils with ASDs, some of the first potential barriers to learning might include … distractability within the physical context … sensory over-stimulation … visual barriers are important to help them focus on their assignments." Each student in the research classroom thus had an allocated individual workstation for independent work.

However, classroom observations and staff feedback identified that the students' current independent workstations were not sufficiently meeting students' needs. The workstations were created from an improvised combination of mis-matched and cluttered items of furniture, and incorporated numerous screens to eliminate distractions (see Figure 9.10). Classroom observations and staff feedback showed that:

- the mismatched and cluttered furniture presented a distraction to students, and consequently students were being distracted by the very furniture items which were supposed to eliminate distraction
- the mismatched and cluttered appearance of the classroom furniture was aesthetically unpleasant, and created a very busy and chaotic environment which was detrimental to the sense of order and calm required for the students to engage in learning. There was a definite consensus that the students would benefit from a more clean-cut and organised design
- Shelving and screens created health and safety risks as they could easily be knocked over
- the work tables presented the same problems as those identified earlier for the group / 1:1 table (see section 9.4.5)

Figure 9.10: Examples of students' original independent workstations

Sensory Profiles

Information acquired from the sensory profiles obtained for 4 of the 5 students in the research classroom during the first phase of the project also suggested that the visual environment may be an important factor to consider in the development of an

appropriate learning environment for these students. Three of the profiles identified a probable difference with regards to visual sensitivity, and one profile identified a definite different with regards to visual sensitivity. The profiles state that "children who are sensitive to … visual stimuli may make attempts to limit this input, and tend to work better in more controlled, less cluttered environments." This correlates with staff observations that at times the cluttered furniture was itself a distraction to the students.

Planning:

An account by Donna Williams, describing her ideal learning environment, identifies that "it would be one where the physical arrangements of things in the room was cognitively orderly and … where only what was necessary to learning was on display and there were no unnecessary decorations or distractions" (Williams, 1996, p. 284). The importance of a visually organised, uncluttered and structured environment is also highlighted by Mesibov and Howley (2003, p. 9 & 26), who state that "the physical structure of the classroom can also minimise distractions, promoting more consistent and effective work" and that "an effective physical structure helps to decrease the visual and auditory stimulation that can be distracting and troublesome for pupils with ASD." This view is also supported by Worth (2005, p. 43), who outlines that for students with autism, "the screens and the wall he is facing should be as plain and free from distraction as possible." Clearly therefore, due to the sensory processing difficulties of students with autism, it is important that independent workstations appear visually tidy and uncluttered in order to support students with autism to engage as effective learners.

Action step:

The new Leca furniture discussed above comprised both a group / 1:1 work area, and an adjoining area for independent work or 1:1 work (see Figure 9.11). In this way, it was anticipated that the new furniture would eliminate the need for any additional furniture, screens or shelving, as students would be facing away from each other for independent work, thus providing a clean-cut, functional and compact approach to classroom furniture.

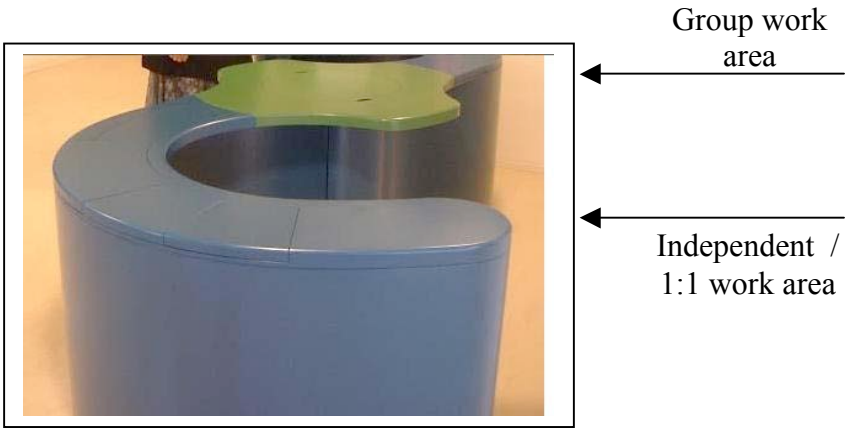


Figure 9.11: 2- Person Leca furniture

Evaluation:

Upon the introduction of the Leca furniture, classroom observations immediately identified a major issue with the 1:1 / independent work section of the furniture: there was no space available to provide the worksystems required to store, organise and structure the students' independent work. Since the students required this level of structure to understand what was expected of them, and thus to enable them to work independently, staff observed that the absence of this structure would cause students to be confused, stressed and anxious. As a result, it was decided that the students' existing independent workstations, although not ideal, would have to remain in the classroom, since they provided a more suitable space for independent work.

When the students did complete work on the 1:1 / independent work section of the Leca table, classroom observations identified a number of additional issues. These included:

- The independent work areas were too narrow to provide sufficient desk surface area to support the students' poor fine motor skills and organisational skills. Consequently they repeatedly dropped materials and struggled to complete work independently
- The narrow size also prevented students from completing larger A3 tasks which would normally constitute a significant proportion of their work
- The absence of adequate screening resulted in students being easily distracted

Based on these observations and the initial classroom observations of the original workstations, some key factors were identified regarding the design of suitable independent workstations for the students. These included:

- capable of supporting the level of structure required by the students' TEACCH worksystems
- suitable screening - to prevent distraction and enable students to engage in learning
- A clean-cut design - to prevent an aesthetically unpleasant, cluttered, chaotic and distracting environment
- An 'all-in-one' design - to eliminate the health and safety issues associated with free-standing screens
- A muted neutral colour - to provide a calming environment and promote engagement
- A matt finish - to prevent glare / reflection issues

The reflective nature of the PAR approach employed meant that although the initial independent workstation modification was unsuccessful, these key points could subsequently be utilised to inform the design of new independent workstations. This process was undertaken during phase 2 of the PAR spiral, and thus will be discussed in detail in the next chapter, together with additional comments obtained from the interviews and questionnaires regarding independent workstations.

9.4.7 School Chairs

Identifying the Problem:

Classroom Observations

Classroom observations revealed that the current school chairs represented both a distraction and a health and safety risk for the students, since:

- Students frequently rocked back on their chair legs during class work time, which both prevented them from engaging and distracted other students (see Figure 9.12)
- Students sometimes tipped back so far they fell backwards off the chair, which created a health and safety risk

Figure 9.12: Student rocking back on chair legs

Planning:

"It is well known to teachers that poor seating has a major impact on a child's ability to concentrate, to learn and on their personal safety" (dlb, n.d.). In the period between 1999-2002, 7000 children were admitted to hospital each year in the UK alone due to chair-related accidents (www.hassandlass.org.uk), and 70% of these injuries arose from students rocking back on chair legs (Pytel, 2008). As a result of falling off chairs, students often bang their heads on desks, chairs, furniture, radiators or the floor. Whilst most resulting injuries are minor, such falls can cause serious injuries such as concussion and even death. Furthermore, "not only does a child leaning back put him or herself in danger, it constantly stops the flow of lessons; reducing the ability of a teacher to explain new concepts and for a whole class to stay focused. It is a constant interruption that can be avoided" (dlb, n.d.).

As well as the disruption and health and safety issues identified through classroom observations of these chairs, feedback from staff also revealed that the chairs provided inadequate lumbar support and did not promote good posture, with the result that students slouched and fidgeted in their chairs, and staff frequently complained of back ache. In the past, the importance of comfortable classroom furniture and seating has not been emphasised, however in recent years educators have begun to recognise that "uncomfortable, inappropriately sized furniture can detract from learning" (Kennedy, 2004). Indeed, in a 2001 teacher survey, 99% of teachers questioned maintained that comfortable classroom seating has a strong influence on students' ability to engage in learning (Schapiro, 2001).

In addition, many studies across the UK and other countries over the past 15 years have shown an increasingly high occurrence of back pain in teenagers. Estimates of lifetime prevalence rates for low-back pain in children has been found to vary from 13-51%, with point prevalence ranging from 1-33% and the prevalence of recurrent low-back pain ranging from 7-27% (Burton, Clarke, McClune & Tillotson, 1996; Hakala, Rimpela, Salminen, Virtanen & Rimpela, 2002; Harreby et al., 1999; Jones, Stratton, Reilly & Unnithan, 2004; Leboeuf-Yde & Kyvik, 1998) Furthermore, the prevalence of adolescents affected by chronic or recurrent back or neck pain which is sufficient to prevent school attendance or participation in sports activities has been shown to range from 7%-27% (Burton et al., 1996; Jones et al., 2004).

Risk factors associated with childhood back pain include an array of physical, environmental, psycho-social and genetic issues, however an easily rectifiable environmental factor implicated in childhood back pain is “poorly designed low cost school furniture causing postural strain” (Gardner & Hettinga, 2006). Furthermore, according to recent research, “regarding low back pain, sitting posture is the most troublesome situation” (Motamedzade, 2008, p. 9). Based on this information, the decision was made to source suitable classroom seating which would address the health and safety, distraction and posture issues discussed.

Action Step:

The Leca furniture previously discussed, also incorporated stools (see Figure 9.13) which were “shaped to provide comfortable seating for personal working with a narrower spur to encourage the child to sit well forward during sharing activities” (Burn, 2005, p. 8). In addition, the stools were also considered to prevent rocking, since “the seating stools are heavy and difficult to move which restricts misuse” (Burn, 2005, p. 8). Consequently, the Leca stools were introduced into the classroom for trialling alongside the Leca furniture.

Figure 9.13: The Leca Stool

Evaluation:

Classroom observations following the introduction of the stools found that:

- The students were able to rock on the stools
- The stools were uncomfortable: staff reported that they experienced back ache when using them for any length of time
- The students were observed to experiment with different seating positions, suggesting that they too found them uncomfortable and/or were unclear on how to sit on them

Based on this feedback, the stools were considered not to be meeting the needs of the students or staff, and were consequently removed from the classroom alongside the Leca furniture. Alternative classroom chairs were subsequently sourced and trialled within phase 2 of the research process, and thus shall be discussed in the following chapter, alongside relevant findings from the interviews and questionnaires.

Reflexive Journal Excerpt

. . .It is clear from discussions with the research team and analysis of the surveys that the students rocking during work is a considerable distraction. To address this we have decided to trial anti-tilt chairs to promote the students' engagement in learning. Whilst my observations would support the fact that rocking during lessons is a distraction for these students, I do wonder whether a therapeutic alternative which the students can use to obtain vestibular stimulation during work time might be appropriate? . .

. . .I am following the opinions of the team in exploring anti-tilt chairs, however I am heartened to find that the staff are also emphasising that whilst rocking is a distraction during work time, they also strongly believe that the students do require a suitable chair for rocking during choice time, and thus this too will be an intervention targeted through this research. . .

9.4.8 Rocking Chairs

Identifying the Problem:

Classroom Observations

Classroom observations and staff feedback revealed that the students enjoyed rocking and often used rocking as a calming mechanism to assist with the sensory regulatory difficulties frequently experienced by individuals with autism (as highlighted in sections 3.2.3, 3.2.4 and 5.1.1).

Sensory Profiles

Information acquired from the sensory profiles obtained for 4 of the 5 students in the research classroom during the first phase of the project also suggested that providing opportunities for sensory self-regulatory activities such as rocking may be an important factor to consider in the development of an appropriate learning environment for these students. All four of the profiles identified a 'definite difference' with regard to their ability to modulate sensory input. The profiles state that "children who have difficulty with modulation may sometimes seek out lots of sensory stimuli and other times appear not to notice things around them (or, indeed, fluctuate between the two)." This would correlate with students frequently seeking sensory input through activities such as rocking.

Interviews & Questionnaires

These observations were further supported by the teacher interviews, questionnaires and follow-up interviews, which highlighted *students enjoying rocking and it being important for calming (4).* For example, one teacher commented that:

"X and Y both really really like it [the rocking chair] I think it's that movement thing. We originally bought it for Z, cos he'll sit on the soft chairs and try to rock, and just end up bouncing across the room on a chair … I suppose it's that vestibular motion isn't it, they both seem to really benefit from that, and it's quite calming as well" (T6)

Memoing

MEMO (Rocking chairs)

Whilst is has previously been identified that when the students become distracted by rocking at the table whilst working this hinders their engagement in learning, it is nevertheless clear that rocking is an important sensory self-regulatory activity for students with autism. Previous modifications to the learning environment have attempted to address sensorily overloading aspects of the environment such as colour, pattern, reflectivity, clutter and noise. From this identified 'problem' it is also clear that a suitable learning environment for students with autism must also provide equipment and opportunities for sensory self-regulatory activities such as rocking in order to support the students to maintain a calm arousal state essential for effective engagement and learning.

Planning:

As discussed in depth in sections 3.2.3 and 3.2.4, many individuals with ASDs experience difficulties with sensory processing and regulation and frequently experience an internal state of hyper or hypo-arousal (Baranek, 1999; Baranek, David, Poe, Stone & Watson, 2006; Dunn, Saiter & Rinner, 2002; Greenspan & Wieder, 1997). The vestibular (inner ear) system regulates incoming sensory data and is crucially linked to our attentional system. "Balance, locomotion, discrimination of speech and language, coordination of vision with movement … [all] depend upon the proper functioning of the vestibular system. Additionally, the vestibular system maintains the all important arousal state (through the reticular activating system RAS) necessary to be conscious, alert and responsive" (Hannaford, 2005, p. 169).

Consequently, many believe that there is great value in playground games which stimulate inner ear motion such as swinging, rocking and jumping for assisting individuals with autism to regulate their vestibular systems and thus promote engagement in learning. "Slow, steady movement, such as rocking in a chair usually

lowers arousal" (Biel & Peske, 2005, p. 38), and thus "some children are calmed by vestibular input such as being … on a swing" (Biel & Peske, 2005, p. 37). Consequently, many students with ASDs utilise repetitive movements such as rocking to self-regulate their sensory systems (Baranek et al., 2006; Baranek, Boyd, Poe, David & Watson, 2007; Baranek, Foster & Berkson, 1997), enabling improved attention, engagement and learning (Royeen & Lane, 1991; Williams & Shellenberger, 1996).

In addition, it has been documented that in order to stay alert students may attempt to "activate their balance centres by tilting their chairs so that only the back two legs of the chair are supporting them" (Hannaford, 2005, p. 170). Furthermore, Farmer (n.d.) suggests that "chairs with a swivel glider or rocking mechanism are an easy way to introduce vestibular stimulation." Consequently, although it was felt that the extent of the rocking displayed by the students presented an undesirable distraction during 'work' time as well as a health and safety risk, the staff unanimously agreed that the students required a suitable rocking chair within a designated environment and time to obtain this crucially important vestibular stimulation in order to assist them to regulate their arousal levels. The decision was thus made to introduce a rocking chair for use during choice time.

Action Step:

A traditional IKEA rocking chair was subsequently sourced and integrated into the research classroom. (See Figure 9.14) The decision was made to select a plain, solid colour 'cool' blue upholstery in keeping with the literature discussed in section 9.4.1 regarding colour.

Evaluation:

Classroom observations immediately revealed that whilst the students certainly enjoyed using the rocking chair and seemed to benefit from this sensory regulatory activity, some tipped it dangerously back on its legs which created a health and safety risk. Furthermore, the material with which it was made was not sufficiently robust and quickly wore away, creating large holes. Since it was not waterproof it was also difficult to clean following toileting accidents. Consequently, the chair was removed from the classroom and an alternative was sought. Nevertheless, a couple of important points

were identified which require consideration when selecting a rocking chair suitable for use by students with profound ASDs:

1. The material must be robust, waterproof, and easy to clean
2. The material should be neutral and solid colour
3. The chair should not have legs which can easily be tipped back on

These points reiterate the issues highlighted in section 9.4.1 regarding classroom upholstery and thus were further supported by the interview and questionnaire responses through the gerunds discussed in that section.

Identifying the problem:

Memoing

MEMO (Rocking Chair, part 2)

The difficulties experienced following the first attempted rocking chair intervention reinforce the importance of ensuring that educational environments for students with autism are:
a) suitably robust, and b) waterproof / easy to clean, as identified through previous interventions. Furthermore, they also highlight that special consideration should be given to identifying and eliminating possible health and safety risks in the environment since the students often show little or no sense of danger.

Planning:

It is well documented that students with autism frequently show little or no sense of danger. It has been suggested that this reduced sense of danger may also be a consequence of sensory dysfunction. Brill (2008, p. 24-5) states that children with autism have an "inability to judge danger. Children with autism exhibit deadened or numbed senses. Without the ability to sense their world these children may show little fear of real danger … Children with no real sense of danger can not judge whether or not a step is too high to leap from." Additional investigations to find a safer and more robust rocking chair identified the 'balance ball chair' as a possible alternative to a traditional rocking chair (see Figure 9.14). Research investigating the use of balance ball chairs to improve classroom behaviour of students has found that they can be beneficial for mainstream students (Witt, 2001; Illi, 1994) as well as students with ADHD (Gamache-Hulsman, 2007; Schilling, Washington, Billingsley & Deitz, 2003; Spalding, 1999), those with other SEN including developmental delay (Bill, 2008), and students with autism (Schilling & Schwartz, 2004). In addition, research has also

shown the balance ball chair to be beneficial in improving posture, balance and symptoms of back pain (Merritt & Merritt, 2007; Witt, 2001). Since the balance ball chair was available in a plain dark grey, did not have legs on which the students could tip dangerously back, and was made of plastic and thus easy to clean, it also fitted the criteria listed above.

Action Step:

Supported by this research, a balance ball chair was introduced into the classroom to replace the existing IKEA rocking chair.

Evaluation:

Unfortunately, although once again classroom observations clearly identified that the students enjoyed using the balance ball chair, they also enjoyed disassembling it and playing catch with the inflatable ball. This was extremely disruptive for the class teacher, and caused damage and injury within the classroom when the ball was thrown at furniture, light fittings and people. Consequently it was necessary to remove this chair from the classroom and continue the search for a suitable rocking chair. However, despite the unsuitability of the balance ball chair within this classroom, when it was subsequently introduced into another class it was extremely successful. The teacher of this class observed that the students enjoyed sitting on the chair and focused for long periods of time whilst seated on it. Furthermore, they did not attempt to throw the balance ball within the classroom. This served to highlight the fact that different classes and groups of students may have different needs and may benefit from different approaches.

Identifying the problem:

Memoing

MEMO (Rocking chair, part 3)

This intervention, although unsuccessful in the research classroom, raises a new issue: that of flexibility. Since the Ball chair was successful in another class, it seems clear that due to the range of difficulties and needs presented by students with autism it will be important to ensure flexibility within the design of educational environments for this group of students in order to meet individual needs.

Planning:

Following further searching for an alternative rocking chair, a chair called the Lchair was identified. Produced by a company called Peac Retail, this is an L-shaped rocking chair (see Figure 9.14) which has no legs, thus eliminating the health and safety issues associated with the IKEA rocking chair when the students tipped dangerously back on the chair legs. Furthermore, following discussions with the company CEO, they agreed to make bespoke removable waterproof covers for the chairs to address the cleaning issues identified for the IKEA rocking chair.

Action Step:

The Lchair was thus introduced into the classroom as an alternative rocking chair.

Evaluation:

Classroom observations immediately revealed that the Lchair was a huge success. The students greatly enjoyed using the chair, frequently chose to spend choice time rocking on it, and were observed to engage well in class activities following time spent using the chair. The absence of any legs completely eliminated any health and safety risks and the students could be allowed to enjoy using the chair without intrusive adult supervision. Additionally, it was observed that due to the design of the chair, the students were required to exercise in order to keep the chair in motion. This served to inadvertently increase the amount of exercise they were getting, which in turn further assisted them in remaining calm and focused during work time. The removable waterproof covers were also found to be beneficial to maintain hygiene. Due to the success of the Lchair within this classroom, 6 more chairs were purchased for use within other classes. A pictorial overview of the three rocking chairs trialled through this PAR sub-spiral can be seen in Figure 9.14 below.

Figure 9.14: The Rocking chairs trialled

9.4.9 Equipment and opportunities for physical exercise

Identifying the Problem:

Classroom Observations

Classroom observations revealed that the students often struggled to settle to working within the classroom, and were frequently observed to get up from their chairs and frantically pace around the room during work activities. In addition, students were frequently observed to benefit from periods of time outdoors walking when they were stressed or struggling to concentrate. It therefore appeared that as a result of the sensory regulatory difficulties highlighted in sections 3.2.3, 3.2.4 and 5.1.1, the students both required and benefited from frequent opportunities for movement breaks.

Interviews & Questionnaires

Interview and questionnaire respondents also raised the issue of physical exercise, with respondents discussing *exercise helping students engage and calm (4)*, and the importance of *having equipment for indoor exercise (5).* For example one respondent commented that:

"Indoor exercise spaces are really important. An indoor area where children can go and have a break time together, you know like a play time … I think most classrooms could do with … an exercise machine of some sort, because our kids need regular exercise, and studies have proven that if they have like a 5 minute spell of working, that before they do 5 minutes of work they should do 5 minutes of exercise so that they're calm" (FI2)

Memoing

MEMO (Equipment and opportunities for physical exercise)

This intervention suggests that an important way to accommodate for the sensory regulatory difficulties characteristic of autism is to provide regular opportunities for physical exercise and movement. It is anticipated that this will support the students to maintain a calm arousal state and thus engage as effective learners.

Planning:

As outlined in sections 3.2.3, 3.2.4 and 5.1.1, many individuals with autism experience sensory processing and regulatory difficulties. Studies have revealed that periods of physical exercise can reduce self-stimulatory behaviours and improve the engagement and learning of students with autism (Cheatum & Hammond, 2000; Dunn, 2008b; Lang, Koegel, Ashbaugh, Regester, Whitney & Whitney, 2010; Levinson & Reid, 1993; Petrus, Adamson, Block, Einarson, Sharifnejad & Harris, 2008; Rosenthal-Malek & Mitchell, 1997). Following a review of studies examining the influence of physical exercise for students with ASDs, Lang et al. (2010) conclude that "results suggest that programs for individuals with ASD may benefit from including components designed to incorporate regular and specific types of physical activity."

In addition, as mentioned in section 2.1, the number of children experiencing mental health issues is also rising (Coughlan, 2007; DfEE, 2001b). Furthermore, "children, adolescents and adults with all levels of intellectual disability have a greater risk of developing additional mental health problems" (Coughlan, 2007, p. 89). According to the Count Us In inquiry conducted by the Foundation for People with Learning Disabilities (2002), 40% of young people (13-25yr olds) with a learning disability also have a mental health issue. Emerson & Hatton (2007, p. iv) state that "over one in three children and adolescents with a learning disability in Britain have a diagnosable

psychiatric disorder." In addition, Coughlan (2010) highlights that "mental health difficulties in students with special educational needs present a significant barrier to their learning."

Physical exercise has been found to be particularly beneficial to promote emotional well-being, positive mental health and raised self-esteem (Fox, 2007; Paluska & Schwenk, 2000; Penedo & Dahn, 2005; Spence, Poon & Dyck, 1997). Studies suggest that "those engaged in sport often experience a sense of physical and emotional well-being derived from endorphin release during exercise" (Carpenter, 2007b, p. 161). Furthermore, is has been confirmed that individuals with ASDs do experience this (Jordan, 2001). Since students with profound autism are at considerable risk of developing mental health problems, it would seem essential to ensure that physical exercise forms a regular part of their day. The research would thus suggest that in order to support the engagement and learning of students with profound autism, integrating regular opportunities for physical exercise and movement within the school day is essential.

Action Step:

To this end, an exercise program was introduced at the research school, not only for the students in the research classroom, but for all the students at the school. This involved all students partaking in a physical exercise program every morning before school, either going for a walk around the site with their class for 20 minutes, or joining other students for games such as football.

Evaluation:

Feedback from the classroom staff following the introduction of this exercise routine revealed that the students appeared calmer upon arriving in the classroom for the start of the school day, and were more easily able to engage in their morning lessons. However, the classroom staff nevertheless identified that this benefit was short-lived, and as raised during the interviews and questionnaires, the students also required further opportunities for physical exercise throughout the school day.

Planning:

In order to address this issue, exercise equipment which could be utilised within the research classroom was researched, and an exercise bike was identified as a suitable piece of equipment to be trialled.

Action Step:

An exercise bike was introduced into the research classroom for use during choice time.

Evaluation:

The students were observed to enjoy using the exercise bike, and staff commented that this was beneficial to enable the students to exercise independently during choice time and use up some of their excess energy, which in turn supported them to engage better during lesson time. Nevertheless, staff also observed that providing students with a safe outdoor area to run around and exercise in could potentially be more beneficial than providing exercise equipment indoors as the students benefit from being outdoors. Since it was not possible to trial this modification during the project this shall be discussed in more detail during chapter 11.

9.5 Conclusion

As has been discussed, during the first phase of this research a number of elements in the learning environment were identified to require modification in order to fulfil the aim of this study - to develop a learning environment which supports students with profound autism to engage as effective learners. These were:

No	Modification
1	Chair upholstery
2	Toilet facilities
3	Artificial lighting
4	Laminate
5	Group / 1:1 table
6	Independent workstations
7	School chairs
8	Rocking chairs
9	Equipment and opportunities for physical exercise

Table 9.6: Modifications trialled through phase 1

Of these, issues 2, 3, 5, 6, 7 and 9 were considered to require further investigation. Subsequent modifications trialled to resolve these issues will be discussed in chapter 10 alongside the other issues identified and modifications trialled through the second phase of the project. Furthermore, additional theoretical modifications which it was not possible to trial will be discussed in chapter 11.

CHAPTER 10

RESULTS – PHASE 2

10.0 Overview

As discussed in the previous chapter, a number of modifications to the learning environment were undertaken through the PAR spiral during the first phase of this research. This process was continued during the second phase of the research, the results from which shall be outlined in the present chapter. Following an extended period of research into the concept of student engagement and ways to effectively measure this in students with autism, novel engagement scales were introduced at the start of the second phase of this research in order to assist in assessing the influence of trialled interventions on student engagement, triangulated with classroom observations and staff feedback.

10.2 Baseline data collection

Baseline data was collected at the start of the second phase of the research, when the new 6-student class group was formed.

Table 10.1 and Chart 10.1 show the mean baseline percentage engagement data collected for each of the four activities.

Activity	Baseline Percentage Engagement (%)
Group Engagement	57
1:1 Engagement	88
Independent work Engagement	92
Choice Engagement	55

Table 10.1: Baseline percentage engagement

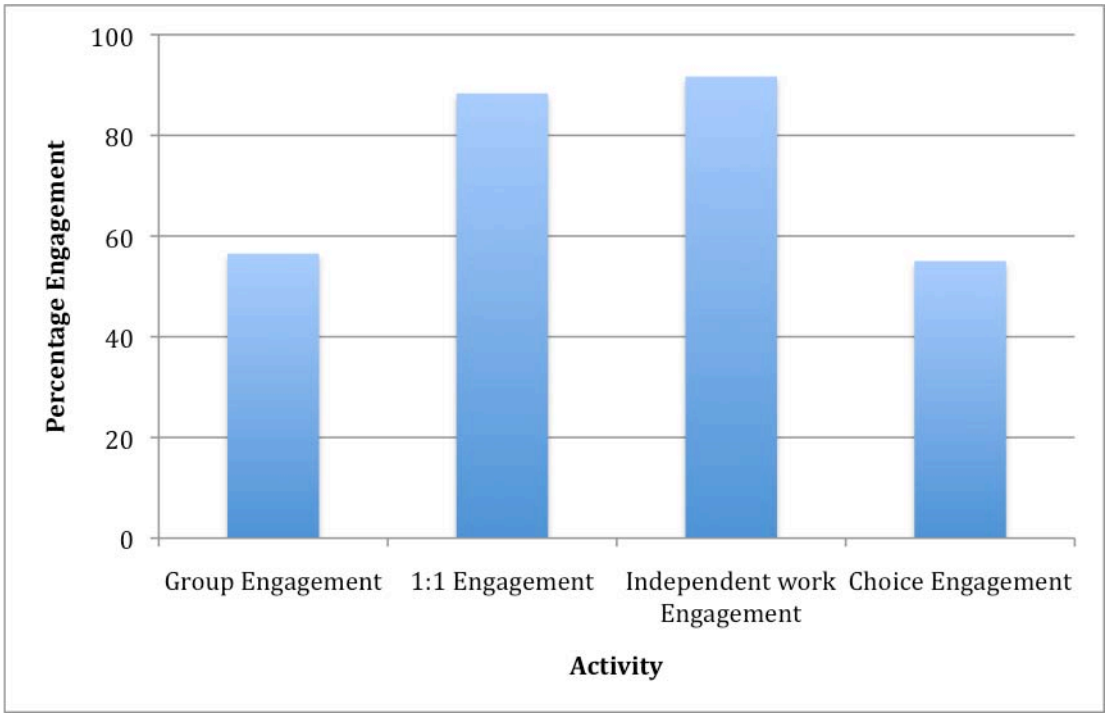


Chart 10.1: Baseline percentage engagement

The baseline data will be discussed further later, with reference to the relevant modifications undertaken during the second phase of the research.

10.3 Phase 2 Results

The results from the second phase of the action research shall now be discussed.

10.3.1 Group / 1:1 Work Table

Identifying the Problem:

Following the unsuccessful introduction of the Leca furniture during the first phase of the project, the need for a suitable group / 1:1 work table within the research classroom remained. The reflective nature of the PAR approach employed meant that although the initial 'Leca' table intervention was unsuccessful, the key points learnt from this action step could subsequently be utilised to inform the design of an alternative group / 1:1 table to trial in the research classroom. Additionally, the baseline engagement data, interviews, questionnaires and follow-up interviews also identified this group / 1:1 table problem and shall now be discussed.

Engagement Data

As clearly illustrated in Table 10.1, out of the three teacher-planned activities observed, student engagement was significantly lower during group work as compared to 1:1 or independent work at the time baseline data was collected. As the unsuitability of the group / 1:1 table had already been identified during the first phase of the research, the engagement data provided additional support for the need to modify this aspect of the environment.

Interviews & Questionnaires

Interview and questionnaire responses provided many comments which highlighted the need for suitable furniture to support the students' engagement in learning, and supported the key points regarding the group / 1:1 table design outlined in section 9.4.5. Consequently, these comments shall be presented now with reference to the key points identified following the first group / 1:1 table intervention.

- **Appropriate and uniform furniture**

Respondents identified the importance of *furniture being appropriate (5)* and *furniture being uniform (7).* For example, one teacher commented that:

"All the same furniture and things, sort of everything the same, all the tables and screens and things like that, I think it would have a much more calming effect instead of all these different things going on. I think that would be quite nice." (T15)

- **A matt finish**

Needing non-reflective surfaces (6) was also highlighted, for example:

"To have a non-reflective surface. I can see this now that there's reflection of that light up there, so that wouldn't help me at all" (T11)

- **Curvilinear design**

Wanting rounded furniture (1) and *students struggling to understand where their bodies are in space (1)* were also issues raised. For example:

"Quite a few students must feel a certain amount of vulnerability, because you know autism, they don't know where the back ends and starts and everything, they haven't got the relationship to themselves, their body, so on and so forth" (T13)

- **Heavy, strong and sturdy tables**

The importance of *furniture being robust and sturdy (8)* was also mentioned by respondents. One respondent highlighted that:

"Good sturdy furniture which doesn't snap with a single kick or whack would be good" (R3)

- **Space for teaching staff to be seated alongside students**

Needing adequate space for staff (4) was another important consideration mentioned:

"Students are cramped around tables and there is not enough space for staff to sit alongside them so that each child can access the group activities with the necessary support" (R3)

- **Flexibility in table structure and size**

A number of staff mentioned the importance of *furniture being flexible (8),* commenting that:

"I hope we can still be flexible within the classroom, and not have lovely furniture that you just can't move about because as students come and go, again, you're looking at the individual, and we would need to move or reduce or add furniture (T12)

- **Sound absorbent table material**

The issue of classroom acoustics was highlighted by many respondents and will be discussed in detail later. In particular one respondent highlighted the general importance of utilising *"materials / furnishings which absorb noise" (R1).*

- **Muted neutral colours**

The importance of *using the right colours (14)* was also a consideration raised by a number of respondents. Comments included:

"With the colour schemes, you know that our students need to have sort of more muted colours, nothing too bright and garish" (T8)

In addition to supporting the criteria raised by the first group / 1:1 table intervention, respondents also raised the issue of *tables needing to be height adjustable (2)* in order to ensure furniture is the right height for different age / size students and prevent back problems. For example, one teacher stated that:

"If the tables are the wrong height" that can be a problem (T13)

Memoing

MEMO (Group / 1:1 table)

This 'problem' has highlighted a number of ways in which furniture can exacerbate the sensory processing difficulties of individuals with autism. As evidenced by the upholstery, laminate and 'Leca', consideration of the colour and reflectivity is clearly important to reduce visual overload and support the students to engage in learning. Furthermore, this 'problem' also highlights the need to use suitable materials which deaden acoustics to reduce auditory overload, as well as to consider the impact of proprioceptive dysfunction when designing the shape of furniture for students with ASDs. In addition to this, the requirement for robust and heavy furniture again reiterates the observations from earlier memos, that providing furniture and furnishings which are 'fit for purpose' and can withstand abuse from challenging behaviour is also crucial to ensure the environment is suitably safe and remains aesthetically pleasant and in good condition. This intervention also reinforces the importance of flexibility. It seems that in order to accommodate the range of difficulties and needs presented by students with autism it will be important to ensure flexibility within the design of educational environments for this group of students in order to meet individual needs. Finally, as highlighted through the unsuccessful introduction of the 'Leca' furniture, the needs of these students clearly necessitate that suitable furniture allow for a high adult:student support ratio.

Planning:

Until recently, little consideration was given to the design of school furniture, and it was frequently utilitarian and uniform. As a result, research has shown that as many as 70-80% of students are using inappropriately sized furniture, and that this can affect learning (Milanese & Grimmer, 2004; Parcells, Stommel & Hubbard, 1999). However, it is increasingly becoming recognised that children are different sizes, and that providing appropriately sized furniture can enhance both learning and posture. According to Bennett, Woodcock & Tien (2006, p. 62):

> *"If the work surfaces are low, students lean or hunch forwards as they work. This forward flexion of the trunk puts considerable stress on the lower spine, while forward flexion of the head increases tension in the neck and shoulder area. Tables that are too high require elevation of the upper arms and can make fine motor co-ordination required by writing more difficult."*

Consequently, it is now recognised that providing an adjustable table is important in order to assist students in maintaining the correct anatomical alignment when sitting and using desks (Murphy, Buckle & Stubbs, 2004), and their use has been shown to provide long-term benefits (Linton, Hellsing, Halme & Åkerstedt, 1994).

In addition to height adjustability, the importance of employing flexible furniture within schools is also gradually coming to the forefront. According to a report prepared by the British Council for School Environments (BCSE),

> *"Creating appropriate environments to support different learning styles within the four walls of a classroom is difficult when all you've got is 30 polypropylene chairs and 15 rectangular tables … In order for the infrastructure of a school to fully support learning, we believe we need spaces that reflect different teaching and learning styles, requiring flexible furniture solutions."* (Clarke, 2008, p. 17 & 29).

This view is also supported by Caroline Buckingham, director of HLM architects who have designed a number of schools for Buildings Schools for the Future. She reveals that "in the past couple of years we've started to realise that what is going to have more of an impact on the learning environment is a 'cocktail of furniture' that allows the spaces we've created to be used flexibly and meet the educational vision of the school" (Kennett, 2010).

In chapter 9 sections 9.4.1, 9.4.4 and 9.4.5, the literature surrounding the need to address the issues of colour, reflectivity, and the shape of furniture in order to accommodate the sensory processing difficulties experienced by individuals with autism (as identified in sections 3.2.3 and 3.2.4) was reviewed. The literature surrounding acoustics and the need for sound-absorbent materials shall be considered in section 10.3.5 during the discussion on flooring. Furthermore, as highlighted throughout chapter 9 (see sections 9.4.1 and 9.4.2), the needs of individuals with autism also predicate that consideration should be given to the issue of robustness.

Based on this information, the decision was made to invite a school furniture design team to visit the school in order to create a bespoke group / 1:1 table which was specifically designed to meet the needs of the students. Fundamentally, according to Kennett (2010), "bespoke products are often needed if the educational transformation is to be realised." The design team were given the opportunity to observe the students working on the original table, and then joined a learning environments research team meeting to discuss key issues. Due to the reflective nature of the PAR approach employed, the key points identified following the first table intervention and supported by the interviews and questionnaires were used to create a design brief for the new group / 1:1 table which incorporated:

1. Matt finish
2. Neutral grey colour
3. Heavy and robust materials
4. Adjustable height legs
5. Flexibility in size and configuration
6. Sound absorbent material
7. Curvilinear design

Action Step:

An initial prototype for the new class table was trialled within the research classroom and can be seen in Figure 10.1

Figure 10.1: Bespoke group / 1:1 table

Evaluation:

Classroom observations and staff feedback following the introduction of the new group / 1:1 table, revealed that it was a significant improvement on both the original table and the Leca furniture. Findings included:

- The furniture was robust, strong and sturdy. There was the option of securing it to the floor, however none of the students in the research classroom were observed to move the furniture, even without it being secured

- The matt surface greatly reduced reflection problems resulting in a reduction in the sensory behaviours surrounding the reflective surface
- There was some reduction in the noise made when the tables were banged, leading to a perceived reduction in banging by students
- Staff commented that the neutral, grey table colour contributed to a calmer atmosphere within the classroom
- The neutral grey table colour also prevented students being distracted by the furniture, and helped work stand out from the table, enabling students to engage better in activities
- Staff commented that the curves made navigating around the table easier
- Behaviour management issues associated with the Leca furniture were addressed as staff were able to sit next to students to provide 1:1 support
- The furniture was flexible, students could be seated at any position around the table, the table could be separated to make two smaller group / 1:1 tables and the height of the table could be adjusted to accommodate different aged pupils or to allow pupils to stand and work

Feedback from other teachers who visited the classroom to view the new furniture also provided very positive feedback regarding the *bespoke furniture being an improvement (8).* For example, they commented that:

"The table appears to be very successful. The size allows plenty of space for each student and members of staff, but at the same time it's not too big. The colour and matt surface work well and it is serviceable in terms of cleaning" (TF5)

As discussed earlier, baseline engagement scale data revealed that student engagement during group work was particularly low, with students engaging only 57% of the time spent doing group activities. Engagement scale data collected following the introduction of the new table revealed a dramatic increase of 11% in group engagement during group activities. Furthermore, engagement during circle time which was originally only 49%, improved by an impressive 14% (see Table 10.2 and Chart 10.2).

	Percentage Student Engagement (%)		
	All Group Work	**Circle Time**	**Group Games**
Baseline	57	49	70
New Table	68	63	74

Table 10.2: Student engagement during group work following new table

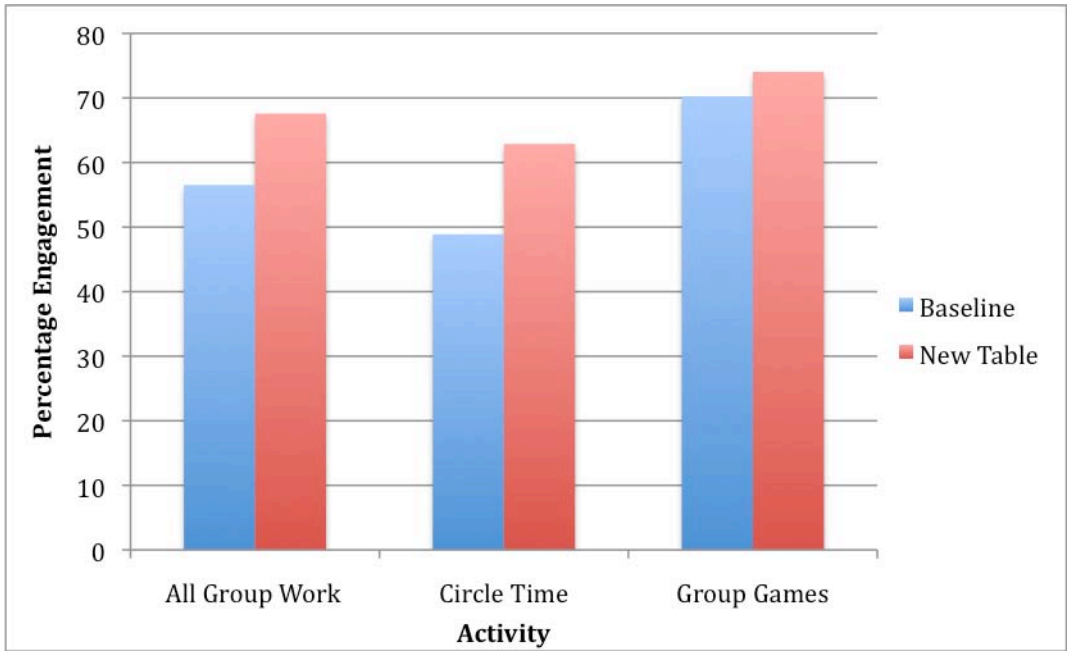


Chart 10.2: Student engagement during group work following new table

Furthermore, ritualistic engagement reduced from 2% to 0.6%, suggesting that the new table successfully reduced self-stimulatory behaviours.

In addition, student engagement during 1:1 work also improved following the introduction of the new table, with an average improvement of 8%, and an improvement for individual students of up to 17% (see Table 10.3 and Chart 10.3).

	Percentage Student Engagement (%)	
	Baseline	**New Table**
Simon	88	98
Claire	76	93
Jane	87	99
Joshua	100	100
William	96	95
Liam	83	90
Mean	88	96

Table 10.3: Student engagement during 1:1 work following new table

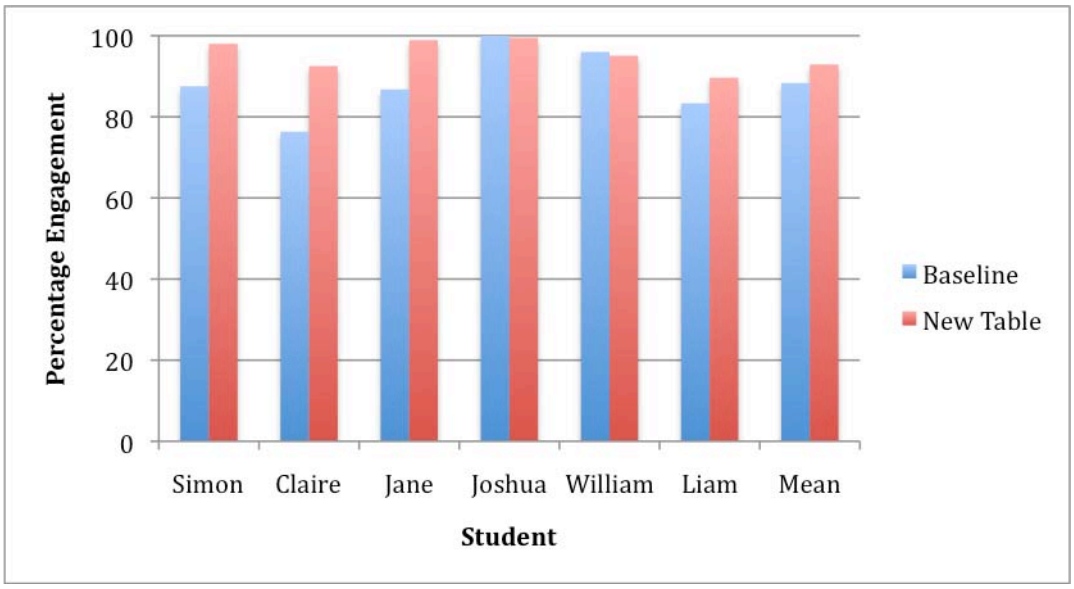


Chart 10.3: Student engagement during 1:1 work following new group table

Despite the obvious benefits arising from the new group / 1:1 table, one problem identified was that although it consisted of two sections joint together, the sections were very large which made it difficult to re-organise the classroom if required. It was therefore decided that the design should be adapted to ensure that it was comprised of smaller sections to increase flexibility within the classroom. The issue of *tables needing to be more flexible (3)* was further supported by comments made by other teachers visiting the classroom who suggested that:

"I would radius all four corners to allow the tables to be used individually" (TF2)

A possible anticipated issue was that the smaller sections may be slightly lighter and thus easier for students to tip, however it was decided that the need for increased flexibility outweighed this potential problem. In addition, it was suggested that the table legs should be circular rather than square, as staff found the sharp edges painful if they accidentally hit the table legs, and that for aesthetic reasons the table rim and table legs should be grey to match the table top.

Identifying the problem:

Memoing

MEMO (Group / 1:1 work table, part 2)

The problems identified with the initial bespoke group table intervention reinforce the importance of flexibility within the learning environment for students with autism in order that individual student needs can be addressed to support their engagement in learning. Even where a potential conflict exists between flexibility and safety, the staff are adamant that increased flexibility is more important to provide an effective learning environment which enhances student engagement.

Planning:

In order to address these issues, further discussions were undertaken with the furniture design team, and a modified version of the table comprised of smaller sections with a grey rim and circular grey legs was designed.

Action Step:

Due to time constraints it was not possible to trial a new prototype for the modified class table, however computer generated images of the new designs were created and can be seen in Figure 10.2. Furthermore, the new tables have since been successfully installed within the new school, and staff continue to provide positive feedback. Photographs of the different configurations employed to meet varying class needs in the new school can be seen in Figure 10.3. A follow-up study to evaluate the effectiveness of these tables would be a key area for prospective research in the field.

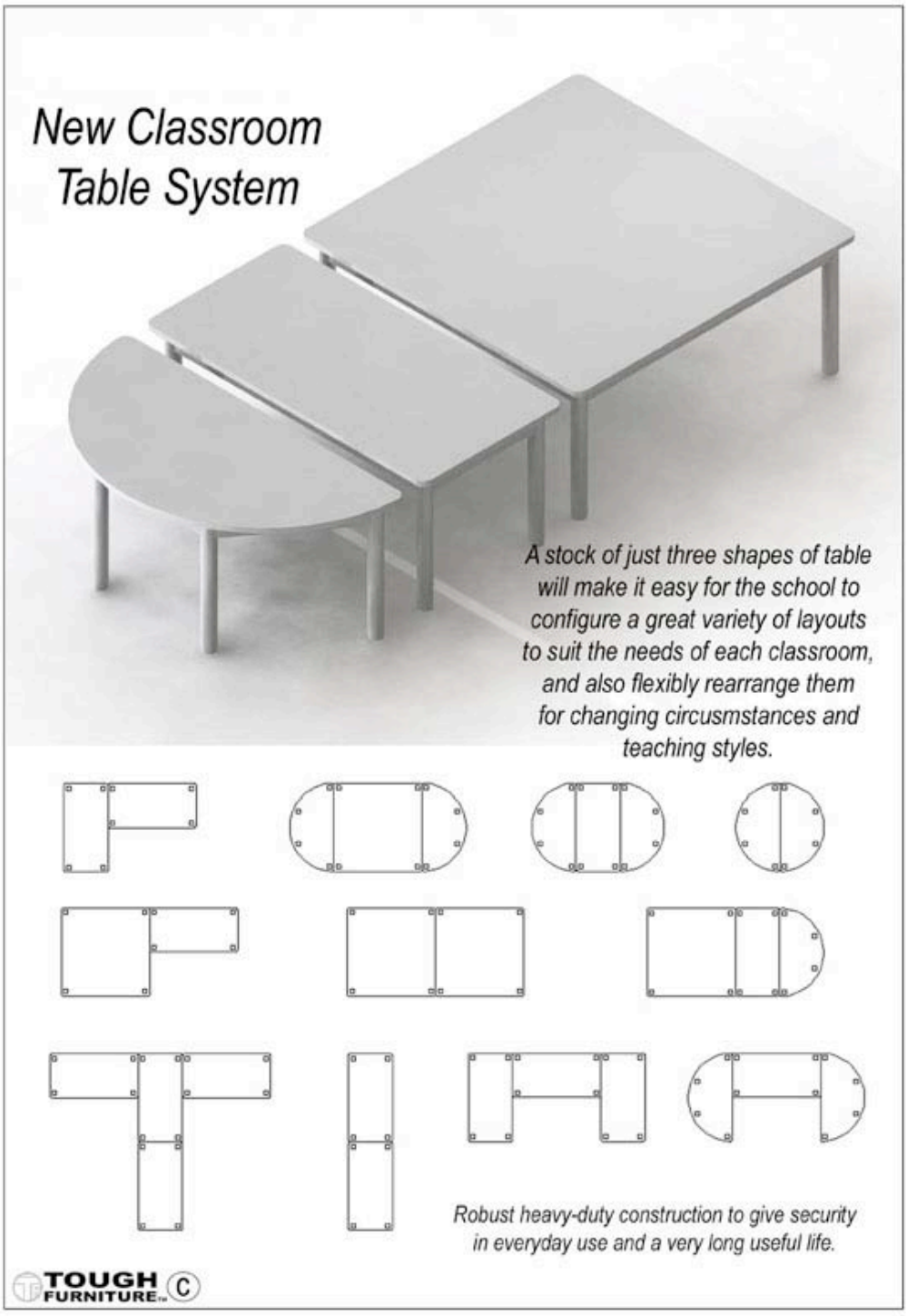


Figure 10.2: The new classroom table system

This design has since been installed within the new school, and photos of the different arrangements chosen to meet the needs of different class groups can be seen below:

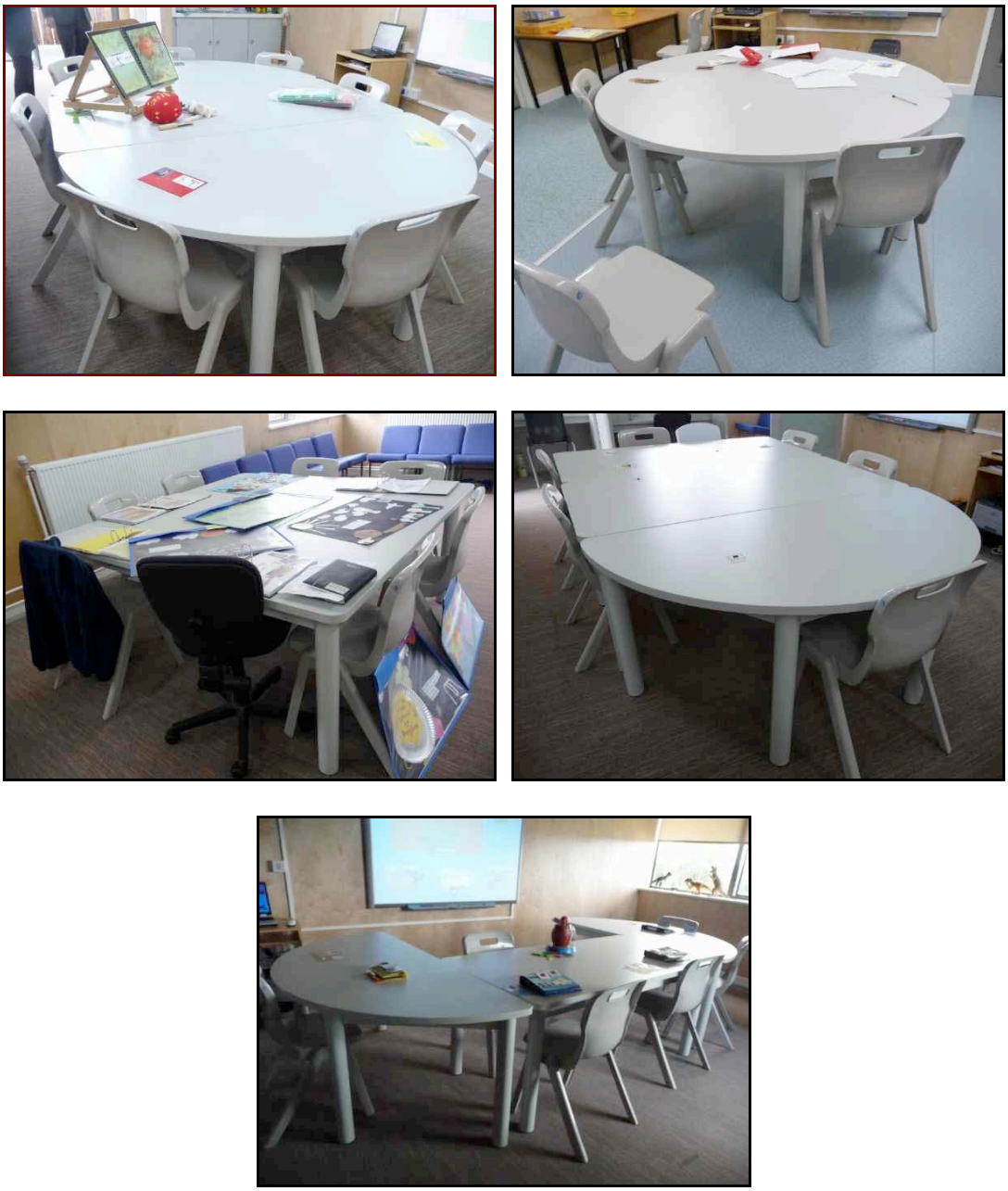


Figure 10.3: Classroom tables in the new school

Reflexive Journal Excerpt

. . .I am extremely excited about the opportunity to work with a furniture design company to develop bespoke furniture specifically to meet the needs of these students. Unlike the Leca intervention which felt very much 'backwards' – attempting to fit the students around the furniture - this intervention will hopefully provide the opportunity to design furniture specifically around the needs of the students, which certainly makes more sense to me. . .

. . .Having the furniture design team visit the school and join the learning environments team meeting today was extremely beneficial. I worked collaboratively with the teaching staff in the research classroom to come up with a design specification for the bespoke furniture. Undertaking this process collaboratively hopefully ensured that the perspectives of the students and staff were accurately portrayed to the designers. . .

. . .Through combining the research classroom staffs' observations with those of my own, and inviting all the teachers at the school to provide feedback on the new furniture I have made a conscientious effort to incorporate multiple perspectives to evaluate the bespoke furniture. This collaborative evaluation revealed some flaws which it will hopefully be possible to resolve for future designs. . .

10.3.2 Independent Workstations

Identifying the Problem:

Following the unsuccessful introduction of the Leca independent workstations during the first phase of the project, the unsuitability of the students' independent workstations continued to be an issue within the research classroom. The reflective nature of the PAR approach employed meant that although the initial 'Leca' independent workstation intervention was unsuccessful, the key points learnt from this action step could subsequently be utilised to inform the design of an alternative independent workstation to trial in the research classroom. Additionally, the interviews, questionnaires and follow-up interviews also identified this problem and shall now be discussed.

Interviews & Questionnaires

Interview and questionnaire responses provided many comments which highlighted the need for suitable independent workstations to support the students' engagement in learning, and supported the key points regarding the independent workstation design outlined in chapter 9. Consequently, these comments shall be presented now with reference to the key points identified following the first independent workstation intervention. Comments regarding the need for appropriate and uniform furniture were discussed above. The issues of colour, reflectivity, and shape were discussed in chapter 9 sections 9.4.1, 9.4.4 and 9.4.5 respectively.

- **Capable of supporting the level of structure required by the students' TEACCH worksystems**

Many respondents discussed issues surrounding the provision of suitable structure to facilitate students to engage in learning. *Classrooms having physical/visual structure to support students (15)* was a high priority for many staff, and respondents highlighted the structure implicit in *workstations supporting students to focus (5)*. For example:

"When you want them to actually concentrate on work, I have experienced that having high physical structure is conducive to learning a lot more and being more engaged than an open structure." (T13)

- **Suitable screening**

Many respondents discussed using screens for visual structure to help students focus (9) and the importance of *workstations having suitable screening (2)* for example:

"It is occasionally necessary to alter the environment to make it less distracting for a child, for example screening off an area so that a child is not disturbed by others" (R25)

In addition, many respondents also discussed the issues of *clutter distracting students (16)* and *students being distracted by window views (6),* as well as the importance of *making classrooms a distraction-free, low arousal environment (27)* and the fact that students can be easily distracted by their peers *(peer groupings (17)*. These issues will each be discussed in more detail during the relevant results sections, however cumulatively they serve to highlight the high distractibility of students with autism, and thus the importance of having suitable screening to support students to engage in learning.

- **A clean-cut design**

As discussed in section 10.3.1, some respondents referred to the importance of *furniture being uniform (7).* In addition, as mentioned above, many respondents also highlighted the issue of *clutter distracting students (16)* and consequently the importance of *workstations having suitable screening (2)* and *making classrooms a distraction-free, low arousal environment (27)*. For example, as stated by this teacher:

"To have workstations that are suitable and reduce visual stimulus from around. I think that's very important … it would be nicer to be a bit more uniform, I think kids would accept and tolerate more stuff banging around then, yeah … a bit more uniform." (T7)

Memoing

MEMO (Independent workstations)

The importance of reducing visual distractions in the environment for students with autism appears a recurrent feature within this research, with 'problems' so far identifying colour, reflectivity, patterning, lighting and now clutter as important elements which can be modified to reduce sensorily overloading aspects of the environment and thus promote engagement in learning. This 'problem' also reiterates the importance of considering the impact of challenging behaviour on the design of educational environments for students with autism, highlighting the importance of having robust and sturdy furniture which is 'fit for purpose' in order to minimise damage and avoid health and safety risks associated with furniture being tipped or knocked over. Finally, it is clear from the unsuccessful 'Leca' intervention that school design must take into consideration the teaching approaches used within the classroom to ensure that the design of the learning environment supports and facilitates the implementation of teaching approaches which enhance engagement for this group of students.

Planning:

Based on these findings, the decision was made to invite a school furniture design team to visit the school in order to create independent workstations which were specifically designed to meet the needs of the students. The design team were given the opportunity to observe the students working at their original workstations, and then joined a learning environments research team meeting to discuss key issues. Based on the previous findings, the brief created for the new independent workstations incorporated:

1. Matt finish
2. Neutral grey colour
3. 'All in one' design with fixed screens
4. Heavy and robust materials
5. Sound absorbent material
6. Curvilinear design

Action Step:

An initial prototype was trialled within the research classroom and can be seen in Figure 10.4:

Figure 10.4: Bespoke Independent Workstation

Evaluation:

An evaluation of the new independent workstations revealed that they were a vast improvement on the previous mis-matched furniture. Staff observed that the neutral colour of the furniture combined with the curvilinear and neat design contributed to a calmer atmosphere within the classroom and promoted student engagement. This was supported by feedback from teachers visiting the classroom, whose comments can be seen in the above section on the group / 1:1 table. This is further supported by observations of student engagement which showed improvements of 5% and 11% for the two students who initially trialled the prototype workstation (see Table 10.4 and Chart 10.4).

	Percentage Student Engagement (%)	
	Old Workstation	New Workstation
Simon	84	95
Joshua	81	86

Table 10.4: Student engagement during independent work following new workstation

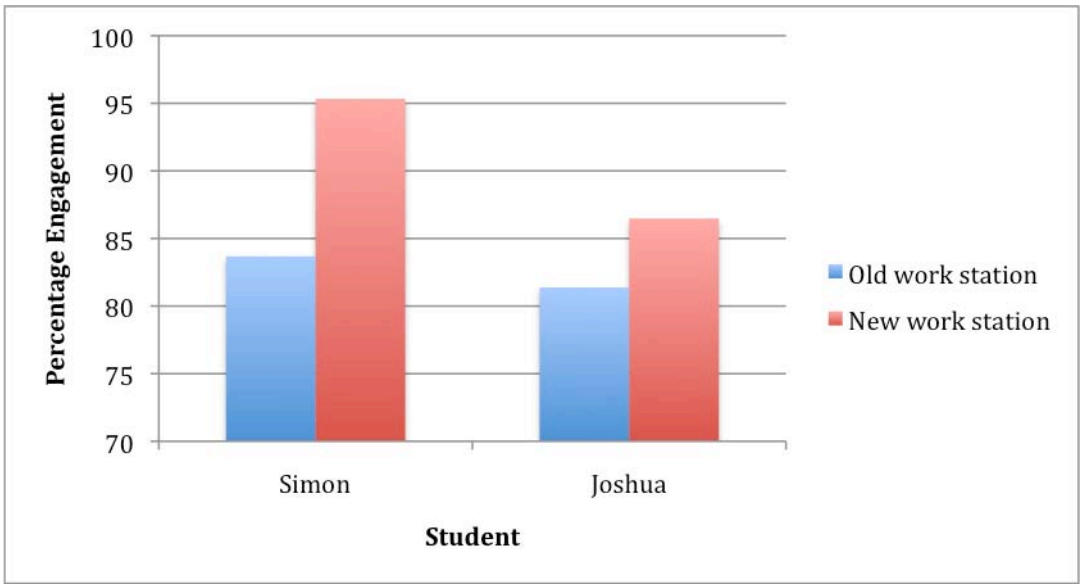


Chart 10.4: Student engagement during independent work following new workstation

Classroom observations and staff feedback nevertheless identified a few issues with the new workstations. Firstly, the screens needed to be more robust than those in the original prototype, since one student in the research classroom hit the screens so violently that they came away from the table. The issue of the *screens needing to be more robust (5)* was also raised by staff visiting the classroom:

"The workstation sides I believe are too flimsy in construction as they are made of chipboard which does not offer a great deal of strength. Replacing the chipboard with plywood may solve the problem as the laminated structure of the plywood is inherently stronger." (TF2)

In addition, the issue of *worksystems needing to be fixed to the desk for health and safety reasons (2)* was also highlighted:

"The task shelf was very heavy but still portable, being potentially lethal if thrown" (TF4)

Thirdly, the prototype had a fixed 3-sided structure which provided a greater level of structure than was required by some of the students. Consequently it was considered to be inappropriate for some of the students in the research classroom to trial the workstation since it would have been an unnecessary increase in the level of support

they required. A key issue therefore identified was that the workstations needed to be more flexible to enable staff to provide the necessary level of structure required by individual students.

Interviews with teachers and questionnaire responses also supported the idea of *workstations needing to be (more) flexible (9)* as did teacher feedback:

"I think in any design there needs to be built in flexibility so that we can arrange it for a variety of students' needs" (TF9)

The key issues identified with regards to flexibility were:

(1) *Screens needing to be adjustable in height / removable / addable (4)*

"I think we do need flexible screen heights on the workstation … could we also ask for an option of no screen?" (TF10)

(2) Desks needing to be wider to accommodate larger tasks (9)

"I felt that the workstations were not wide enough. There was not enough room at the side to put tasks, so that the tasks took up too much table/working space" (TF4)

(3) Worksystems needing to be available in different sizes to accommodate different sized tasks (7)

"The only thing that I thought needed tweaking were the work trays, they were too small and would not be able to fit in larger posting tasks" (TF3)

Identifying the problem:

Memoing

MEMO (Independent workstation, part 2)

The difficulties experienced from the first bespoke independent workstation intervention again reinforce the importance of flexibility within educational environments designed for students with autism in order to meet individual needs. They also re-emphasise the importance of ensuring robustness to withstand abuse from challenging behaviour and considering potential health and safety issues.

Planning:

Following this evaluation, the issues identified were discussed with the furniture designers. It was decided that:

1. The workstation screens needed to be created from a suitably robust and tough material and attached with bolts

2. The workstations needed to be a “tool-kit” so that teachers could add, remove, extend and reduce screens as required by individual students
3. The workstations needed to be wider to accommodate larger tasks
4. The worksystems needed to be available as either narrow stacked shelving for those that have advanced to flat A4 paper sized tasks or wider shelving to house the larger 3D tasks used by the more concrete students
5. Worksystems would be bolted to the desks for health and safety reasons

Action Step:

Due to time constraints it was not possible to trial a new prototype for the modified independent workstations, however computer generated images of the new designs were created and can be seen in Figure 10.5. Nevertheless, the new independent workstations have since been successfully installed within the new school, and staff continue to provide positive feedback. Photographs of the different configurations employed within the new school to meet different student’s needs can be seen below in Figure 10.6. A follow-up study to evaluate the effectiveness of these independent workstations would be a key area for prospective research in the field.

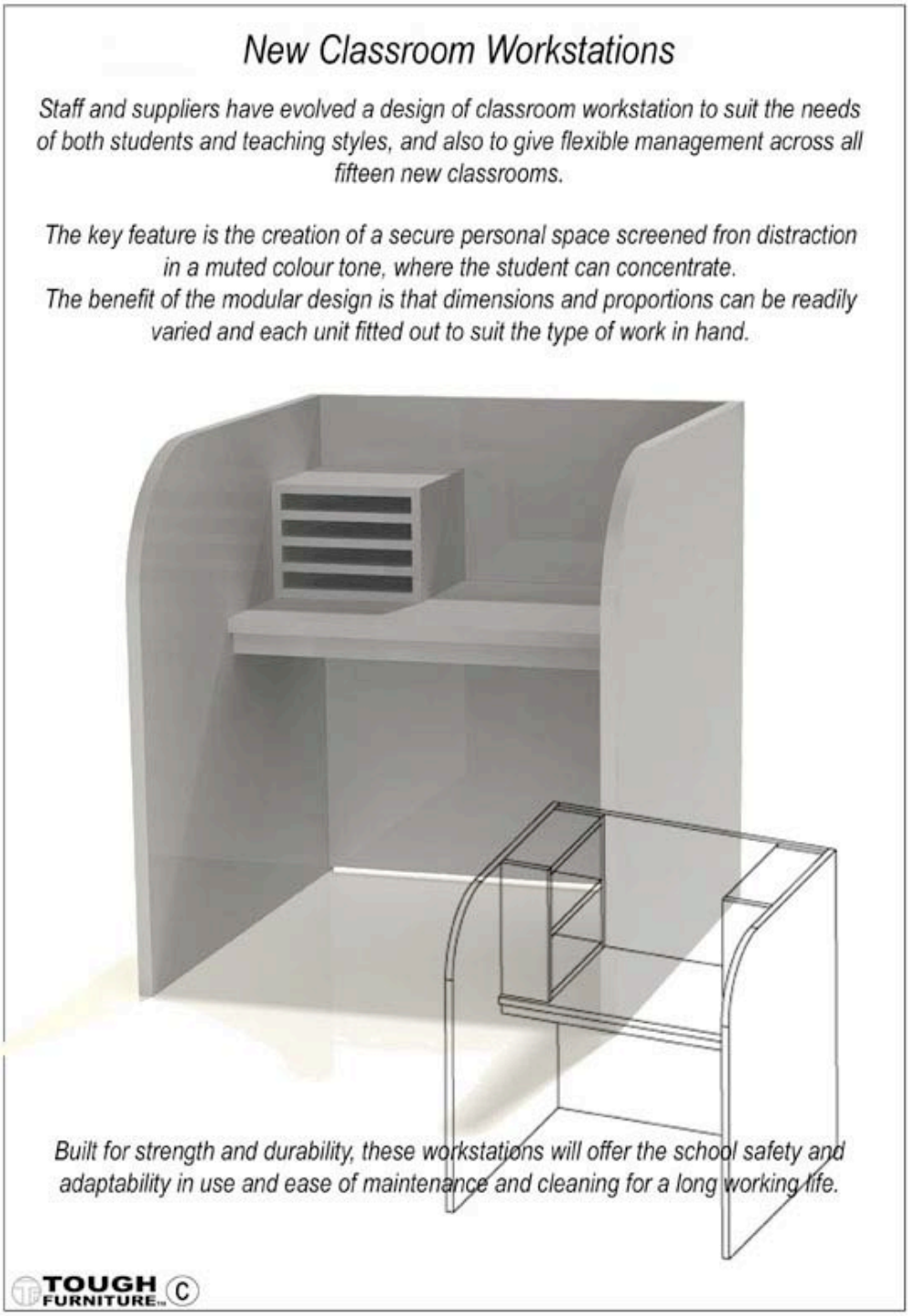


Figure 10.5: The new classroom workstations

Figure 10.6: The independent workstations in the new school

10.3.3 School Chairs

Identifying the Problem:

Following the unsuccessful introduction of the Leca stools during the first phase of the project, the issue of students rocking on the school chairs continued to be a problem within the research classroom. The reflective nature of the PAR approach employed meant that although the initial 'Leca' stools intervention was unsuccessful, the key points learnt from this action step could subsequently be utilised to inform the design of alternative classroom chairs to trial in the research classroom. Additionally, the interviews, questionnaires and follow-up interviews also identified this problem and shall now be discussed.

Interviews & Questionnaires

Many of the interview and questionnaire respondents discussed the need for suitable school chairs and the problems arising from *students rocking on school chairs (7)*. For example:

"I think chairs are quite important, for some of ours, if you have a look in our classroom we've got umm, it looks a bit of a mess round our group table, cause we've got lots of different types of chairs … they all need something different from their chair. X needs a sturdy chair that he can't rock on … Y's got a little stool, because if Y sits on a regular chair, or even the chair that doesn't rock that we've got for X, Y rocks backwards and forwards and then he can't concentrate on what he's doing" (T5)

In addition, they also discussed the issue of *chairs needing to promote good posture / comfort (2)*:

"If the chairs aren't comfortable… if the chairs are the wrong height" that can prevent students from engaging (T13)

Memoing

MEMO (School chairs)

Whilst students rocking on chairs is a problem experienced in all schools, it would seem that rocking is both particularly common and a significant distraction for this population of students, possibly due to the sensory dysfunction experienced by these students. However, whilst it is acknowledged that providing opportunities for sensory-regulatory activities such as rocking is essential for students with autism, it also seems clear that students rocking during 'work' time impedes their engagement and learning. Identifying alternative chairs which limit this will hopefully improve student engagement and learning. However, in order to address the needs of this group of students it is also clearly essential to provide a suitable rocking chair for use at other times.

Planning:

In the search for appropriate classroom seating which would eliminate the constant disruption and health and safety risk arising from the students rocking back on their chairs, a company called 'Don't Lean Back Ltd' (dlb) was identified, which had recently designed a chair specifically to address these issues. "The unique aspect of the dlb... Max chair is that with its carefully designed frame, it actively prevents children from leaning back on their chairs" (dlb, n.d.). Due to the reflective nature of the PAR approach employed within this research it was also clear from the previous interventions that three additional issues which required consideration were:

- the need for school chairs to promote good posture and be comfortable

- the need for the chairs to be available in neutral pale colours
- the need for the chairs to be robust

The Max chairs were advertised to promote “excellent ergonomic posture” (dlb, n.d.) since they comply with the new European standards which necessitate the provision of adequate back support in school seating, and thus were hoped to meet the first criteria. Since the chairs were available in two neutral colours, white and grey, the second criteria was also easily met. However, since the Max chairs were a newly developed design, there was no information available regarding their robustness, and thus this would have to be established through the trial.

Action Step:

Following discussions with the Max chair designer, the chairs were trialled within the research classroom in both white and grey. A photo of the chairs can be seen in Figure 10.7.

Figure 10.7: White Max Chair

Evaluation:

Classroom observations revealed that the chairs were successful at preventing students from rocking back on the chair legs. Furthermore, staff observed that the white colour of the chairs facilitated a calm environment within the classroom conducive to engagement and learning. In addition, engagement scale data revealed that student engagement did improve following the introduction of the new chairs. As

illustrated in Table 10.5 and Chart 10.5, group engagement improved by a further 3% following the introduction of the new chairs, with engagement during circle time rising by 5%.

	Percentage Student Engagement (%)		
	All Group Work	Circle Time	Group Games
Baseline	57	49	70
New Table	68	63	74
New Chairs	71	68	79

Table 10.5: Student engagement during group work following new chairs

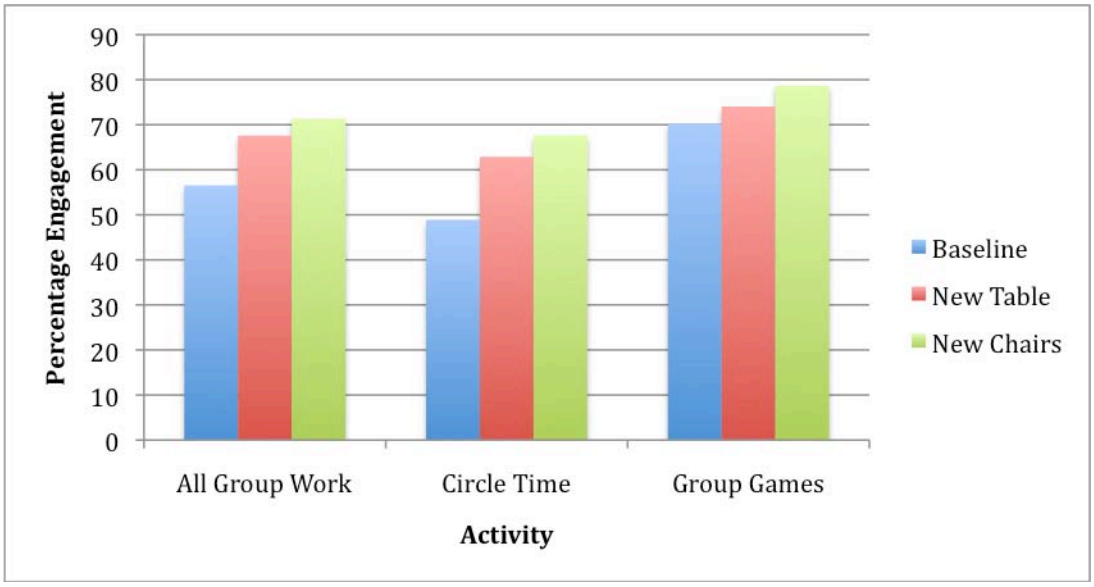


Chart 10.5: Student engagement during group work following new chairs

In addition, student engagement during 1:1 work also improved following the introduction of the new chairs, rising by a further 2%, with individual students showing improvements of up to 7% (see Table 10.6 and Chart 10.6).

	Percentage Student Engagement (%)		
	Baseline	New Table	New Chairs
Simon	88	98	96
Claire	76	93	98
Jane	87	99	100
Joshua	100	100	99
William	96	95	98
Liam	83	90	97
Mean	88	96	98

Table 10.6: Student engagement during 1:1 work following new chairs

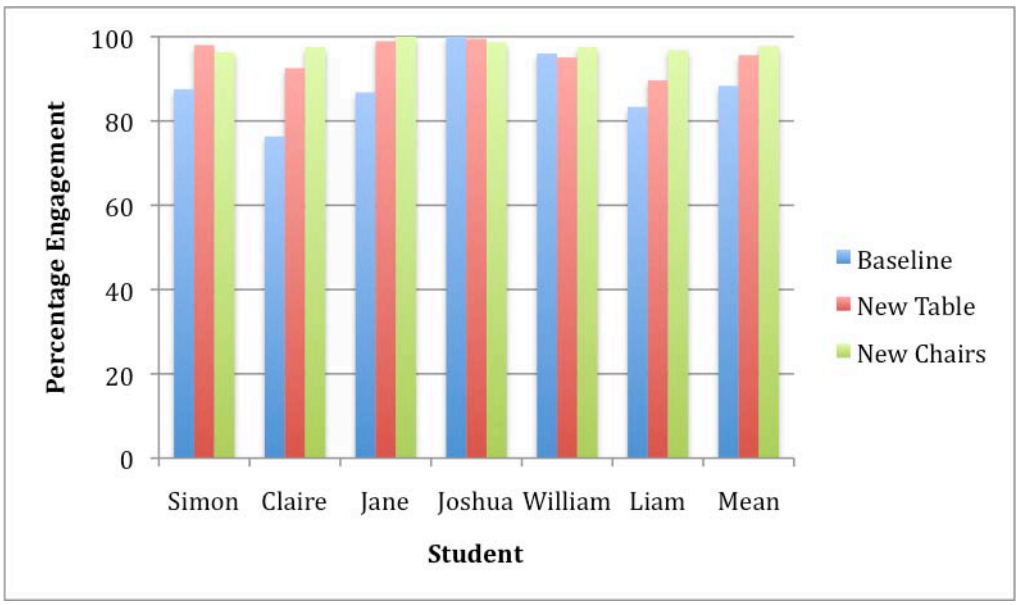


Chart 10.6: Student engagement during 1:1 work following new chairs

Furthermore, student engagement during independent work also improved following the introduction of the new chairs, with average engagement during independent work improving by 6%, 4 students reaching an impressive 100% engagement with the new chairs, and the remaining two reaching 98% and 99% engagement (see Table 10.7 and Chart 10.7).

	Percentage Student Engagement (%)			
	Old Workstation	New Workstation	Old Workstation, New Chairs	New Workstation, New Chairs
Simon	84	95		100
Claire	99		100	
Jane	97		100	
Joshua	81	86	93	98
William	98		99	
Liam	92		100	
Mean	92		98	

Table 10.7: Student engagement during independent work following new chairs

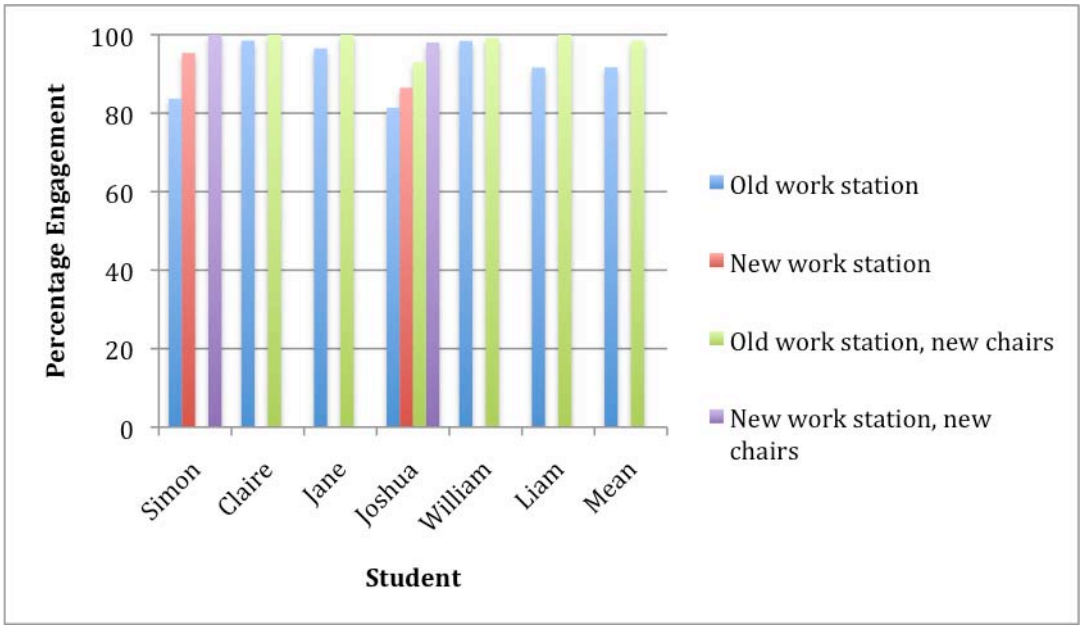


Chart 10.7: Student engagement during independent work following new chairs

However, unfortunately a variety of other problems were rapidly encountered with the Max chairs. The first problem identified through classroom observations was that due to some manufacturing errors, the chairs were not manufactured to a suitably high standard, and consequently the chairs quickly began to fall apart after only two weeks of typical daily use (see Figure 10.8).

Figure 10.8: Max chair falling apart due to manufacturing errors

The second problem identified was that the plastic utilised to form the back of the chair was too flexible, and it was bending when students lent back, provoking them to rock continuously on the back of the chair instead of the legs (see Figure 10.9). This created distraction and health and safety issues akin to the problems identified with the initial chairs. Students were rocking so vigorously on these chairs that they disturbed other students, and occasionally banged their heads on the tabletop as they rocked forwards. In addition, staff commented that the base of the chairs was also extremely flexible which caused the chairs to tip downwards when sat on. This in turn created the sensation that one was slipping off the chair, and indeed students were observed to slide forwards off the chairs on a few occasions. Furthermore, staff commented that this made the chairs uncomfortable to sit on for any length of time.

Figure 10.9: The flexible back of the chair bending when a student leans back and the resulting stress point on the chair

Identifying the problem:

Memoing

MEMO (School chairs, part 2)

The problems experienced with the Max chairs further highlights the importance of robustness, although due to the manufacturing errors the chairs fell apart even without enduring any significant abuse. Nevertheless, it is clear that due to their tendency towards excessive rocking, students with autism require a significantly more robust and sturdy chair back than a mainstream student.

Planning:

Prompted by these observations, the chair designer was contacted and invited to visit the school to observe the needs of the students and discuss possible ways to modify the chair design to improve the chairs' robustness and decrease the flexibility of the chair back and base. To resolve the manufacturing problems, the designer revealed that a new factory was to be used to manufacture the next set of chairs, and that a quality inspector had also been employed. Additionally, various modifications to the design of the chair were discussed to further improve robustness. To resolve the issue of the flexibility of the back and base of the chair, the decision was made to increase the thickness of the plastic.

Action Step:

Following this meeting, modified chairs were introduced into the classroom.

Evaluation:

Unfortunately the modifications applied to the chairs were not sufficient to improve robustness and decrease flexibility to the extent required by the students. The chairs continued to fall apart following very little use, and the students continued to rock excessively and dangerously on the chair backs.

Planning:

In an attempt to resolve these issues the chair designer was once again contacted, however following further discussions it was decided that the options available by which to further modify the chairs were limited, and that it would most likely not be possible to sufficiently adapt these chairs for this group of students. Consequently alternative classroom chairs were researched. An alternative chair called the Titan chair was identified. These chairs are manufactured "from solid high impact polypropylene making the Titan without doubt the strongest classroom chair available today" (Titan Furniture, 2010, p. 2) and have "Ergonomic design to correct children's posture & maintain a healthy spine … [and a] Unique 'S' shaped back … To reduce the incidence and severity of low back pain when sitting a backrest with lumbar support in the correct position reduces low back stress by helping to maintain the natural 'S' shape." They also have "superior strength to withstand the toughest environments", "no sharp edges" and are "anti-tilt …[a] unique leg system prevents children leaning back"

(Titan Furniture, 2010, p. 2). It was thus anticipated that these chairs would meet the criteria identified through previous modifications:

- anti-tilt
- promoting good posture
- robust
- available in neutral colours

Action Step:

Since the Titan chairs were advertised to be anti-tilt, to promote good posture, and to be extremely robust, and were also available in a neutral pale grey colour, the decision was thus made to trial these chairs (see Figure 10.10).

Figure 10.10: Titan Chair

Evaluation:

Following the introduction of the Titan chair, feedback from the teaching staff identified that the chairs were effective at preventing students from rocking back on their chair legs. In addition, the chairs were extremely robust and comfortable, and the material from which they were made prevented students from rocking on the back of the chairs. It was thus clear that the Titan chair was far more effective at meeting the students' and staff's needs than the Max chair. Due to delays experienced with the Max chairs,

the Titan chairs were introduced into the classroom after the official end of the data collection phase of the project, and thus it was not possible to collect engagement scale data to corroborate these findings. However, the Titan chairs have since been successfully installed within the new school, and staff continue to provide positive feedback. A follow-up study to evaluate the effectiveness of these chairs would be a key area for prospective research in the field. Photographs of the chairs in the new school can be seen above in Figure 10.3 and Figure 10.6.

10.3.4 Classroom Structure

Identifying the Problem:

Classroom Observations

Classroom observations and staff feedback during the first year of the project identified the fact that having 4 students and 4 staff within one room created a very busy and noisy environment. It was particularly notable that students in choice were unintentionally disturbing those doing work, which interrupted their engagement in learning. Furthermore, noise-sensitive students were sometimes distressed by the noise level created by other noisy students, which caused increased stress and anxiety, thereby increasing the likelihood of incidences of challenging behaviour.

Interviews & Questionnaires

Many of the questionnaire and interview respondents commented on the importance of the structure of the classroom. The overriding consensus was that two adjoining classrooms provide a more suitable learning environment for students with ASDs than one large classroom, or *2 rooms being better than 1 (26).* For example, some suggested that they *"could do with an extra room"* (R9) and that *"those are the classrooms that have worked the best for me, the classrooms that I've worked in where there's been more than one area … lots of little off-shoots" (FI2).* Their reasons included:

- **Visually separating choice areas and work areas to assist students in understanding what is expected of them in each area**

"There's the room next door, the same size as this, or maybe bigger. I try to keep that as a choice room so that the kids can distinguish between work and choice … I think it works well for them to separate work and choice, they know that they're in here to do work and in there to do choice." (T7)

- **Separating choice areas from work areas to prevent students working from being distracted by those in choice**

"…having separate rooms so that you can have a quiet session going on in one room, and then have a noisy session in another room that's not going to interfere with the learning of the students" (FI2)

- **Separating noisy and noise-sensitive students**

"I've got noisy and noise sensitive students in the same classroom, so having the extra room allows them time away from each other." (T6)

- **Providing a space for students to be alone, or interact socially with staff or peers**

"Some sort of extra room in every class is really useful, for a general choice area, because they have got their individual choice areas which they need, but it is nice to have somewhere as well where they've got the chance to be as a group, even if it is 2 peers together, somewhere where they can interact and play. It's really nice to have a room like that." (T2)

- **Dividing the class should there be any personality clashes and to divide larger groups to prevent students annoying each other**

"I think at times, when there's one classroom, and there's no where else to go, it is quite a hindrance really, to the teacher, and staff. You do need, at times to split the group. Not all children get on with each other, that's reality isn't it, human nature, so I think smaller classrooms, but to have 2, would be far better than one great big space. For safety reasons as well, for all concerned." (T12)

- **Providing a safe space for other students to stay in when one student is having an incident**

"If one student is having an incident, it's easier to move the other students who are calm into the other room, rather than move the child having an incident. Where will they go when this is one room? The corridor? Which then requires high staffing levels. With 2 rooms the other students can all be in the other room, safe with maybe 1 member of staff." (T11)

Nevertheless, some respondents did express concerns about having more than one room, due to *staffing issues arising from having 2 classrooms a distance from each other (3)* experienced previously with two-room or multi-room classrooms where the different rooms were very separate or a long distance apart from each other. For example:

"The only time that it was a problem, was when one of the students was having a particularly hard time, and there was three staff in one side and two staff in the other, but if something happened to that one child it would take 3 members of staff to look after that child and there was not always a way of getting attention from the other room … because there were 3 doors, so even if you did hear someone you had to get through 3 locked doors before you can get through" (FI2)

Memoing

MEMO (Classroom structure)

This identified problem reinforces some previously observed issues which require consideration when designing educational environments for students with autism:
a) It is important to accommodate for sensory processing difficulties. In this instance it is anticipated that auditory and visual distractions and subsequent sensory overload can be reduced through reducing classroom size / the number of students in a room, thereby improving engagement and learning.
b) It is important to consider challenging behaviour and resulting health & safety issues within the classroom. In this instance it is anticipated that having 2 rooms will provide a safe alternative space for other students when 1 student is stressed or anxious. Whilst this may not initially seem directly related to learning, clearly ensuring that an alternative safe and calm space is available for other students when one student is stressed is essential to reduce the distraction caused by the stressed student and ensure that the other students maintain a calm emotional state essential for effective engagement and learning.

In addition to this, this 'problem' also raises other issues which require consideration, including the importance of providing space for group socialisation, whilst at the same time providing students with the option to spend time alone away from their peers. As highlighted through the literature review, social impairments are characteristic of autism, and thus an effective educational environment for these students must be one which promotes socialisation. However, from the issues raised here it is also clear that since socialisation is difficult for students with autism, providing space where students can spend time alone is equally important to enable them to remain calm and engage as effective learners.

Finally, this 'problem' also highlights the importance of designing the educational environment to accommodate for the students' learning styles and needs. Since many students with autism are visual and concrete learners, being able to visually and physically separate a 'work' room from a 'choice/relaxation' room may assist them in understanding expectations and thus facilitate effective engagement and learning.

Planning:

At present there is an absence of research surrounding the most suitable design for the physical structure of classrooms for students with autism, and thus this would undoubtedly be an important area for future study. Nevertheless, other special schools for students with ASDs undergoing redevelopment have been designed to provide classes with more than one room. For example, Rosehill Special School in Nottingham, a school catering solely for students with ASDs, is about to embark on a redesign in which "based around three groupings or 'clusters', each class group has a range of

rooms suitable for activities or quiet solitary moments, and a state-of-the-art sensory room. Every cluster has a 'heart' space where pupils meet, eat and do group activities. This design, mirrored on each level, focuses on socialising the children without making them feel uncomfortable" (Battershall, 2010).

Since it was decided that the student utilising the second classroom involved in the learning environments research should be moved to a more suitable class for the second year of the project, it was possible to trial the use of a separate choice room within the research process.

Action Step:

The second classroom was introduced as a separate choice room at the start of the second year of the data collection phase of the project. Photos of the room decorated to support choice time can be seen below:

Figure 10.11: The Choice Room

Evaluation:

It was clear from classroom observations and staff feedback that having the additional choice space was definitely beneficial for the students, since it provided an opportunity to:

- separate choice and work
- allow noisy and noise sensitive students to spend choice times in separate rooms

- create a more comfortable environment to support student-peer and student-staff interaction (to be discussed in greater detail during the section on Intensive Interaction)
- provide a safe chill-out space for students when they became anxious or stressed (to be discussed in greater detail during the section on chill-out rooms)

Furthermore, since the rooms were adjoining, there were no staffing problems experienced.

Although the new school classrooms were not designed as two rooms, the majority of teachers have chosen to separate their classrooms into distinct areas to differentiate between work and choice. Photographs of this can be seen below:

Figure 10.12: Choice areas in the new school

Reflexive Journal Excerpt

. . .I am really quite intrigued by the findings surrounding classroom structure. It had not occurred to me that having more than one room would provide a more suitable educational environment for this population of students. It is so exciting to stumble across a completely unexpected finding, and this has really grabbed my interest. I would be really interested to visit Rosehill special school to see their new school once it is built. It is certainly frustrating that time constraints have prevented this issue being addressed in the new school. . .

10.3.5 Flooring

Identifying the Problem:

Classroom Observations

Classroom observations revealed that the existing lino flooring did not provide a sufficiently high level of sound absorbency. Students were frequently distracted by background noises such as footsteps, chairs scraping, and echoes, which interrupted their engagement in learning. Furthermore, the poor acoustics exacerbated noise levels within the classroom arising from students banging furniture and shouting, which further interrupted engagement and distressed noise-sensitive students. Due to the reflective nature of the PAR approach employed within this research it was also clear from the previous interventions that four additional issues which required consideration were for the flooring to be:

- available in neutral pale solid colour designs
- robust, durable and hardwearing
- non-reflective / have a matt finish
- easily cleaned / wipe-able

Sensory Profiles

Information acquired from the sensory profiles obtained for 4 of the 5 students in the research classroom during the first phase of the project also suggested that acoustics may be an important factor to consider in the development of an appropriate learning environment for these students. All four of the profiles identified a ‘definite difference’ with regard to their ability to filter out important auditory information from that which is unnecessary. The profiles state that “children who have difficulty modulating auditory input may appear to be distractible or inattentive, and are likely to struggle to follow the requirements of everyday living.” This would correlate with students’ low levels of engagement during group activities and their frequent distraction from background

noises such as footsteps, chairs scraping and echoes. In addition, 3 of the profiles identified a probable difference with regards to auditory sensitivity, and one profile identified a definite different with regards to auditory sensitivity. The profiles state that "children who are sensitive to … auditory stimuli may make attempts to limit this input, and tend to work better in more controlled … environments."

Interviews & Questionnaires

The issue of *noise affecting students (30)* was consistently raised during interviews and questionnaires, with staff emphasising the importance of *classrooms needing to be quiet* (6). Consequently, staff suggested that *"nice flooring"* (T9) is important to improve classroom acoustics. Their comments regarding the flooring correlated with the five issues identified from classroom observations and previous interventions of:

- **Sound absorbent**

Flooring causing echoing / other environmental noise and / needing to be sound-absorbent (9)

"I think you need to look at flooring as well, a lot of classrooms are very very echoey, and that again is a distraction, for the children, and for the staff as well, and it makes any noise much much louder … if it's carpeted where there's a lot of movement i.e. chairs scraping backwards and forwards, this cuts down on the reverberation for the children. You need the sound deadened down." (FI1)

- **Easily cleaned and wipe-able**

Flooring needing to be cleanable (8)

"We have to remember the needs of our students, and while it might not be very nice to talk about with the designers, our kids do things like throw poo, so we need very sturdy floors, and flooring that's wipe-able." (T5)

- **Robust, durable and hardwearing**

Flooring needing to be durable (4)

"Something very sturdy and rigid in terms of the flooring." (T5)

- **Non-reflective / have a matt finish**

As discussed in section 10.3.1 during the discussion surrounding the group / 1:1 tables, staff identified *needing non-reflective surfaces (6).* One teacher specifically commented on the importance of non-reflective flooring:

"Certainly you want non-reflective surfaces on the floor. You know I've seen a student who just really found it difficult to access a classroom, and one of the factors was that is was a very shiny floor, which for fluorescent lights are very reflective, so he found that very hard to cope with." (FI4)

- **Neutral solid pale colours**

As mentioned previously, staff also highlighted the importance of *using the right colours (14)* and *using plain / 'solid colour' finishes (1)*.

An additional issue raised was that of *flooring needing to be suitable to sit on (4)* since some activities require students and staff to sit on the floor, and lino or vinyl flooring can be unpleasant to sit on. Furthermore, some staff also discussed *having an area of flooring suitable for sliding / wet play (2)* with one respondent suggesting that a combination of hard and soft flooring is the ideal solution since:

"Within the classroom, if you have a sliding area, and a carpeted area, if you want to do Sherborne, or a floor-based activity which involved sliding, you've got the opportunity to do both then, so to have some area which is a slide area, and an area where you can have dirty play, the reason I've got my room like this is because I had a sand box out this morning and stuff like that, so they've got an area where it doesn't matter what happens on the floor, and I've got a quiet area as well, so you've got a quieter area and a mucky area." (FI1)

Memoing

MEMO (Flooring)

This 'problem' reinforces a number of previously raised issues.
1. To accommodate for the sensory processing difficulties experienced by individuals with autism, consideration of sensory aspects of the environment including sound absorbency (to address auditory sensitivity), reflectivity, pattern and colour (to address visual sensitivity) is essential to provide a suitable educational environment which reduces sensory distractions and overload and thus enhances engagement and learning.
2. Robustness / durability is important to ensure the environment is 'fit for purpose'.
3. Cleanability is essential to ensure hygiene is maintained following toileting accidents.
4. It is important to design educational environments for this group of students which accommodate the teaching approaches being used and address the students' learning styles and needs, thus enhancing engagement and learning. In this instance, staff have highlighted the importance of having a combination of different floorings so that a range of educational activities including wet play, Sherborne Developmental Movement, Intensive Interaction sessions and other floor-based activities can take place within the classroom.

Planning:

It is now widely recognized that "noisy conditions influence learning … noise affects communication between teachers and students, motivation, attention, memory and thus academic achievement … moreover a noisy school environment can be a source of stress for both children and teachers" (Maxwell, 2006b). In addition, as discussed in sections 3.2.3 and 3.2.4, studies suggest that the prevalence of sensory dysfunction in individuals with autism may be as high as 95-100% (Baker, Lane, Angley & Young, 2008; Greenspan & Wieder, 1999). This results in "increased awareness of environmental noises and difficulty in hearing speech in background noise" (Alcántara, Weisblatt, Moore & Bolton, 2004, p. 1107). Consequently, "while poor acoustics in the classroom negatively affect all children, adverse sound environments can be particularly detrimental to children with… an attention deficit or auditory processing disorder" (Bice & Griebler, 2006, p. 2), both of which are frequently observed in students with autism. This view is also supported by the NAS, who highlight that "children and adults with autism may find it difficult to filter out noises that other people can simply block out or ignore" (Nguyen, 2006, p. 12).

As a result of this, Maxwell (2006b, p. 40)

> *"Children with … conditions along the autism spectrum … may require specialised environments in order to maximise their learning potential. This is particularly relevant to sounds and noise … They generally require a space with less background noise … Given that children with autism may have greater difficulty in communicating with the teacher and other students, the presence of background noise will make this process even more problematic"*

According to Maxwell (2006b, p. 43) "teachers … often use carpeting and other soft, sound-absorbent material on floors and walls to create better acoustical conditions." Consequently, it is now being recognised that "because VCT and other hard-surface flooring reflect sound and can create or amplify a din, carpet is a better choice in schools for autistic children" (Myler, Fantacone & Merritt, 2003, p. 4). The NAS further support this, suggesting that "furnishings can help reduce noise levels … carpet or soft flooring is quieter than laminated flooring" (Nguyen, 2006, p. 12). In addition, Holtz, Ziegert & Baker (2004) stress that one should use carpeting within the classroom to address the sound sensitivity and distractibility exhibited by students with autism.

Consequently, research was undertaken to identify possible products to address the need to reduce background noise within the research classroom through providing

flooring which met the criteria of being:

- sound absorbent
- easy to clean
- extremely durable
- comfortable to sit on
- non-reflective
- available in neutral solid colour designs

Whitehurst (2006b) discusses the use of a novel floor covering called Flotex within new residential homes specifically built to address the needs of children with ASDs at the research school. Flotex is a carpet-style flooring, which is “incredibly durable and easy to clean, yet at the same time is soft and warm underfoot” (Bonar Floors, n.d.). An evaluation of the new accommodation shortly after it was built revealed that staff felt that the Flotex “adds another dimension to the sound absorbency of the building and provides warmth and comfort to the house” (Whitehurst, 2006a, p. 7).

Follow-up conversations with the staff working on the new residential homes at the school revealed that since its installation, the Flotex had indeed been very beneficial for improving the acoustics within the building, as well as being extremely durable and pleasant to sit on. However the staff identified ongoing problems with keeping the flooring clean and hygienic. This is an issue also raised by Myler et al. (2003, p. 3) who state that “carpeting carries some drawbacks: it can be more difficult to clean and maintain than hard-surface flooring.” In response to these comments, discussions were undertaken with the cleaners at the research school, who reiterated the fact that they had significant problems keeping the carpet clean. Consequently, in an attempt to investigate and resolve this problem, a meeting was arranged between representatives from Bonar floors (the company who sell Flotex), the school cleaners, the care staff on the new residential home, and the present researcher.

This meeting revealed a number of important issues:

1. The cleaners struggle to find sufficient time to clean the Flotex on the residential house since the students rarely go for more than 3 hours without returning to the house, which is not sufficient time to wash the carpet, rinse

the carpet and give it time to dry. Consequently the cleaners had been omitting the rinsing stage, and excess soap had built up in the carpet which exacerbated the stains

2. The cleaners had not been provided with the correct industrial carpet cleaning machinery necessary to effectively clean the carpet, which was also exacerbating stains
3. The care staff had not been trained in the appropriate method to deal with stains as and when they occur in order to remove them immediately

Due to these concerns regarding the Flotex, the decision was made to trial two alternative floorings from Bonar Floors. The Flotex was trialled in the main research classroom, and another flooring called Chocflex which is a form of cushioned vinyl was trialled within the choice room in the research classroom. Chocflex "provides sound insulation and very good indentation resistance, is hygienic and easy to maintain, and feels soft and warm under foot" (Bonar Floors, n.d.). In addition, it was anticipated that that having two different floorings may be beneficial to enable a range of educational activities to take place within the classroom.

Action Step:

The Flotex and Chocflex were both installed in the research classroom (see Figure 10.13).

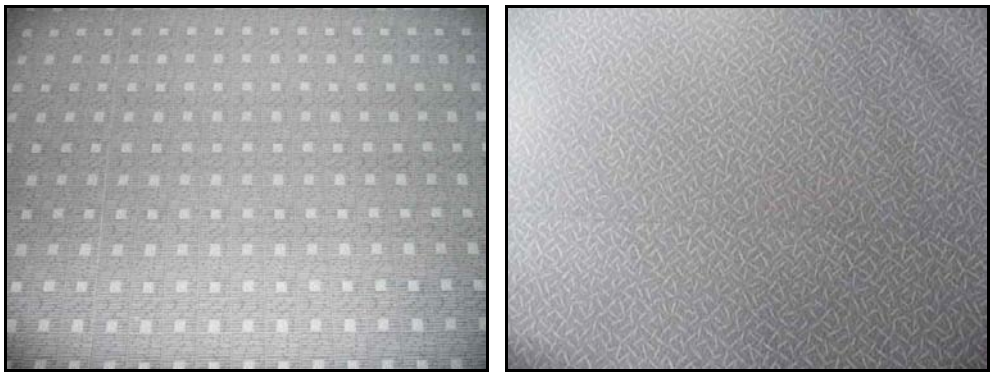


Figure 10.13: Flotex and Chocflex

Evaluation:

Classroom observations following the installation of the new floorings revealed that for the Flotex:

- The students appeared to like the Flotex flooring, since some students who had never previously sat on the floor chose to do so
- The Flotex flooring greatly reduced background noises, i.e. footsteps of people walking around the classroom, chairs scraping on the floor
- The Flotex flooring also reduced echoes when students banged furniture or shouted
- Staff commented that the improved acoustics from the Flotex flooring contributed to a calmer atmosphere within the classroom
- Staff observed that is was more time-consuming to clean the Flotex carpet than the vinyl since it could not be mopped, however when they followed the instructions for cleaning the Flotex it was observed that stains were easily lifted

In contrast, classroom observations for the Chocflex revealed that:

- Acoustically it did not offer the high level of sound absorbency provided by the Flotex, and background noises and echoes remained much more obvious and distracting.
- Staff commented that the Chocflex was far easier to clean since spillages could easily be mopped up

The flotex was thus considered most suitable acoustically to reduce auditory distractions and sensory overload, as well as for floor-based activities. In contrast, the chocflex was considered more suitable hygienically for students who have toileting accidents, and for activities such as messy play.

Engagement scale data collected for work activities undertaken in the main classroom following the introduction of the Flotex flooring revealed that on the whole the new flooring had a positive impact on student engagement. Student engagement during group work improved by a further 3%. (see Table 10.8 and Chart 10.8).

	Percentage Student Engagement (%)		
	All Group Work	Circle Time	Group Games
Baseline	57	49	70
New Table	68	63	74
New Chairs	71	68	79
New Flooring	74	67	82

Table 10.8: Student engagement during group work following new flooring

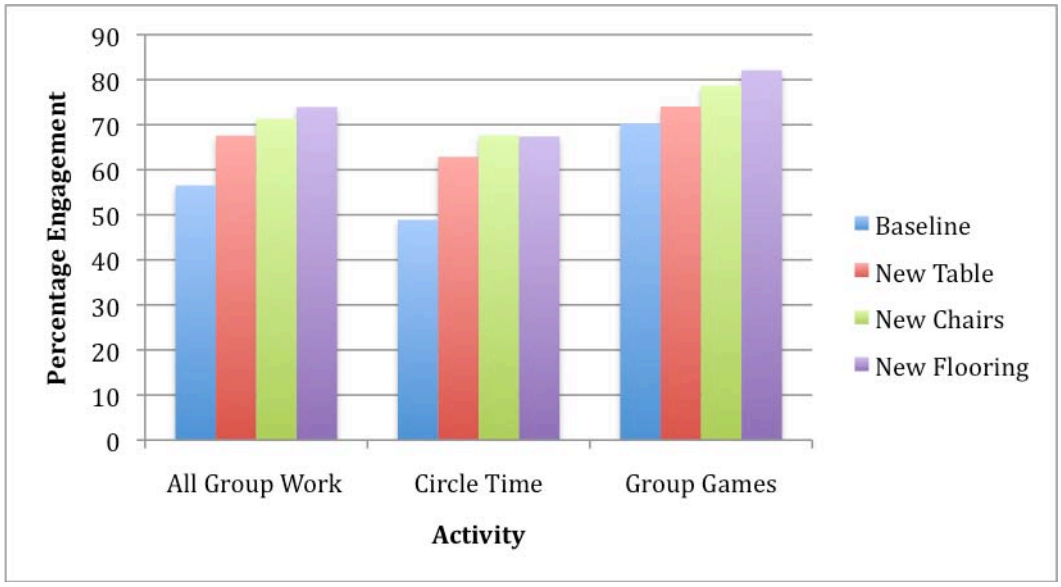


Chart 10.8: Student engagement during group work following new flooring

Average student engagement during 1:1 work remained consistently high at 98%, and 3 students reached 100% engagement following this intervention (see Table 10.9 and Chart 10.9).

	Percentage Student Engagement (%)			
	Baseline	New Table	New Chairs	New Flooring
Simon	88	98	96	96
Claire	76	93	98	100
Jane	87	99	100	100
Joshua	100	100	99	99
William	96	95	98	100
Liam	83	90	97	95
Mean	88	96	98	98

Table 10.9: Student engagement during 1:1 work following new flooring

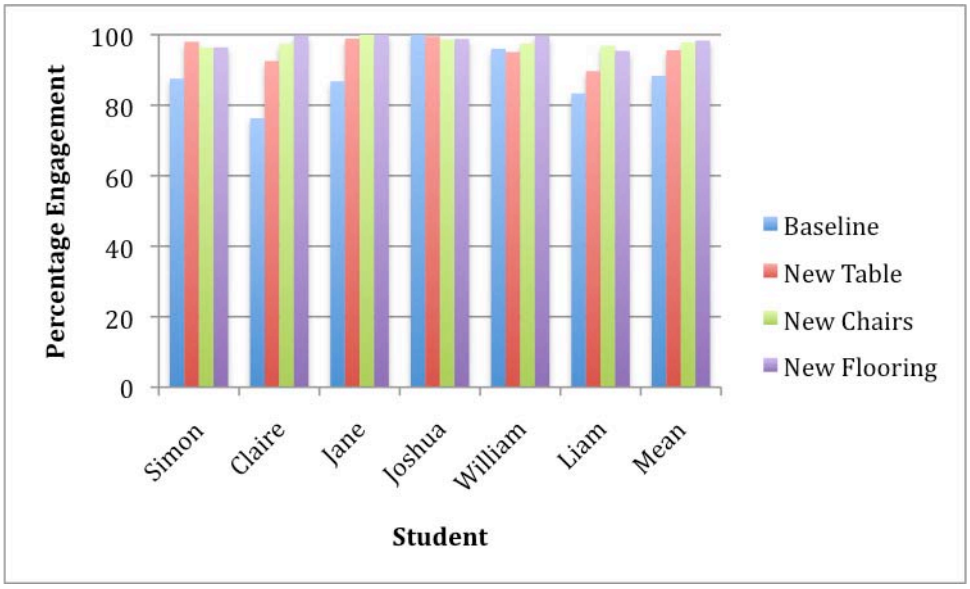


Chart 10.9: Student engagement during 1:1 work following new flooring

Student engagement remained consistently high at 98% following the introduction of the new flooring. Furthermore, percentage engagement obtained for two students whilst benefiting from the new workstations, the new chairs and the new flooring showed levels of engagement of 99% and 100% (see Table 10.10 and Chart 10.10).

	Percentage Student Engagement (%)					
	Old Workstation			New Workstation		
	Old Chairs	New Chairs		Old Chairs	New Chairs	
	Old Flooring	Old Flooring	New Flooring	Old Flooring	Old Flooring	New Flooring
Simon	84		98	95	100	100
Claire	99	100	98			99
Jane	97	100	100			
Joshua	81	93	90	86	98	
William	98	99	100			
Liam	92	100	99			
Mean	92	98	98			

Table 10.10: Student engagement during independent work following new flooring

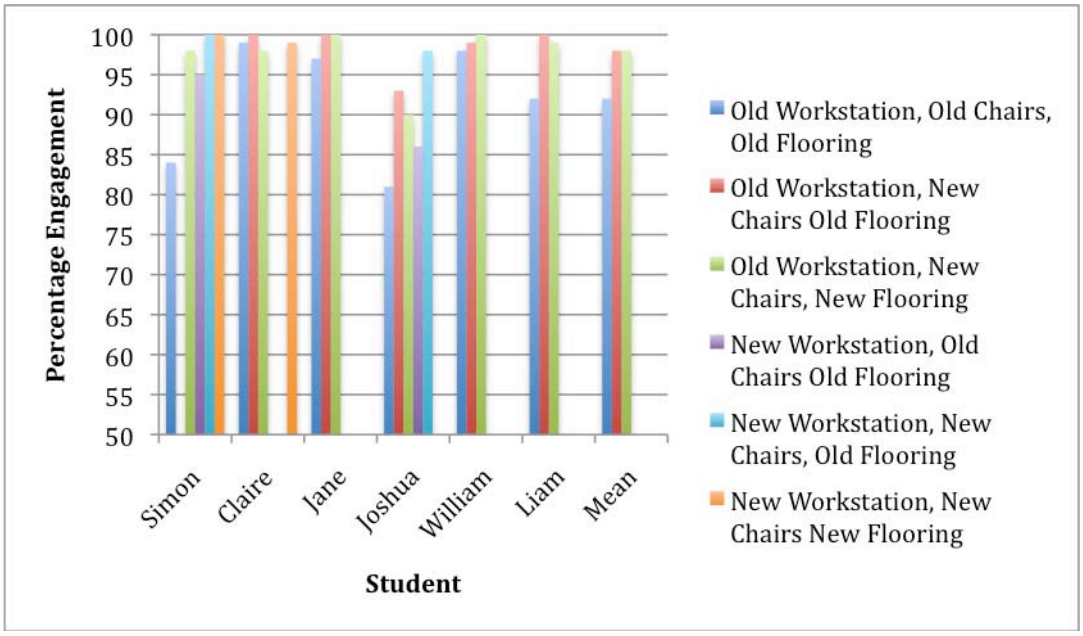


Chart 10.10: Student engagement during independent work following new flooring

One issue identified with the Flotex flooring was that there was limited choice in the patterns and colours available, and consequently a pattern was chosen for trialling in the research classroom which staff subsequently decided was not ideal since the regular repetitive pattern made staff feel dizzy and had the potential to be a source of distraction for the students (see Figure 10.13 above). The issue of patterned flooring is also raised by the NAS. They advise that “patterned floors can be confusing to walk across and may increase anxiety. Some people with autism may become fixated when looking at flooring” (Nguyen, 2006, p. 12). Consequently Bonar Floors were once again contacted, and they revealed that a different catalogue of carpet patterns was available which consisted of screen printed rather than computer generated patterns. The screen printed patterns were considerably more subtle and thus provided more suitable options for the new school.

In addition, it was acknowledged that a compromise would be required with regards to colour, as it would be necessary to install a darker colour than would have been ideal in order to ensure that stains would not be too prominent. Due to the conflicting evidence which indicated that the Flotex provided the best sound absorbency whilst the Chocflex provided better cleanability and hygiene, the decision was made to utilise a combination of both the Flotex and the Chocflex within the new school, with different classrooms having different floorings to address the needs of different student groups.

Furthermore, every classroom benefits from a sectioned area of moppable flooring initially intended for the kitchenette area (to be discussed in greater detail later). This section also fulfils the dual purpose of providing an area for wet/messy play and sliding on the floor should it be required for this purpose. The neutral solid colour design eventually chosen for the Flotex in the new school can be seen below in Figure 10.14. Figure 10.15 illustrates the kitchenette area flooring suitable for wet play / sliding.

Figure 10.14: Flotex chosen for the new school

Figure 10.15: Moppable flooring

10.3.6 Chill-Out Room

Reflexive Journal Excerpt

. . .the dilemma posed by the cleaning/acoustic issues attached to the flotex and chocflex is interesting. I am inclined to feel that the acoustic properties of the flooring are more important, and the representatives from Bonar floors certainly successfully convinced me that the flooring can be adequately cleaned if the correct equipment and process is used. However, equally, it is clear from the feedback from staff that they consider the clean-ability of the flooring to be the priority. Clearly a compromise is needed… perhaps each classroom could have a combination of both floorings? It is interesting that where flexibility clashed with safety (for the group table) the staff favoured flexibility, but where cleaning clashes with acoustics the staff favour cleaning. . .

. . .to resolve this issue the school have decided to go with both floorings but in different classrooms… those with toileting issues will have the chocflex, whilst the others will have the flotex. This was clearly a necessary compromise to resolve this issue, however I am concerned that the students with the toileting issues may also be those with the greatest sensory sensitivities and are thus those who would benefit most from the flotex! Unfortunately having a combination of both in each classroom was not an option due to financing, however this may be the best option where possible as it would also allow for different activities e.g. wet play, sliding, and could be used to visually separate different areas of the classroom. . .

. . .Having the opportunity to meet with representatives from Bonar floors has been really beneficial to resolve the cleaning issues surrounding the flotex flooring. Similarly, from the input received from having the bespoke furniture designers and the Max chair designer visit the school, and from working alongside the Lchair designers, it is clear that it is extremely beneficial to establish links with relevant companies and where possible have them visit the school to enable them to understand the needs of students with autism and adapt their products as necessary so that they are suitable for this population of students. . .

Identifying the Problem:

Classroom Observations

Classroom observations within the research classroom revealed that during the first year of the project, when students became stressed and/or exhibited challenging behaviour, there was no available safe space for students to calm down in. For the safety of the staff and other students in the classroom, students exhibiting challenging behaviour were often redirected to the bathroom to calm down, however this resulted in the toilet facilities being damaged, as discussed in section 9.4.2. As an alternative, students were sometimes taken outdoors, however this required two members of staff to accompany the one stressed student, leaving the remaining students understaffed. It was therefore clear that a designated chill-out room was desperately needed.

Interviews & Questionnaires

Many of the interviewees and questionnaire respondents mentioned the importance of *students needing a quiet space to calm down when anxious (28).*

For example they commented that:

"I think it's very fundamental that you should have a nice quiet area away from all the other students so that if a student is beginning to show signs of distress they've got somewhere to go to give them the opportunity of calming themselves down. If we can teach them to calm themselves then they've got something for life then." (T13)

Memoing

MEMO (Chill-out room)

This 'problem' reiterates the importance of considering health and safety issues and the sensory dysfunction and challenging behaviour common amongst students with profound autism when designing educational environments for this population of students. As discussed for 'classroom structure', ensuring that the other students have a safe, calm space to maintain their engagement in learning when one student is stressed is clearly important. In addition, this 'problem' clearly highlights that a designated chill-out space is an essential element of all classrooms for students with ASDs in order to provide a safe and low-arousal environment in which students can be left alone to calm down when they are anxious or stressed. In this way it is anticipated that they will be able to regain a calm arousal state and thus return to engaging in learning as quickly and with as little disruption to the school day as possible.

Planning:

As discussed in sections 3.2.3 and 3.2.4, students with autism frequently exhibited sensory overload as a result of their sensory processing and regulatory difficulties. Heeden, Ayres, Meyer & Waite (1996) suggest that teachers should provide quiet relaxation spaces for any students who need time away from the main classroom. According to Holliday-Willey (2003, p. 248) "our kids uniformly seem to require a 'chill-out' place at school. An overstimulated child needs a way to regain control." The DCSF (2008a, p. 13) also support the view that "children with autistic spectrum disorders … need a safe space to calm down." Furthermore, the DfES ASD Good Practice Guidance (2002a, p. 91) highlights that there should be "facilities for the child to withdraw from class ('chill out') when they are, or are likely to be, sensorily overloaded."

The creation of a chill-out room within the research classroom occurred as a beneficial consequence of the second classroom being vacated for the second year of the project, and the room being designated as a choice room. Whilst this space was thus

not specifically or solely a chill-out room, it nevertheless was possible to utilise it as such when students became stressed or anxious.

Action Step:
During the second year of the project, staff were able to redirect students into the choice room to calm down during and following an incident.

Evaluation:
Whilst using the choice room as a chill-out space was an improvement on the previous year, this nevertheless necessitated moving any other students using the choice room into the main classroom when an incident occurred. Furthermore, since the room provided storage to the students' choice equipment, and housed a desk and chairs, the furniture remained at risk of damage, and the safety of the student was a concern. A positive however, was that staff could watch the student from the office where a two-way mirror replaced the adjoining wall for observation purposes. Consequently it was possible to provide students with space to calm down alone, whilst ensuring their safety by watching from the adjoining room. The importance of the *chill-out room having a window to observe students (1)* was also outlined during a staff interview.

This information fed into the incorporation of designated chill-out rooms within all the classrooms in the new school. For these rooms it is essential to provide a low-arousal environment which is neutral in colour and free of clutter. In addition staff highlighted the importance of the *chill-out room needing to be padded (3)*. Unfortunately for financial reasons it was not possible for the rooms to have padded walls and floors, so instead they have been filled with beanbags and cushions to ensure students' safety. As an alternative to high-cost padding, Farmer (n.d.), suggests that "interlocking foam tiles (see Figure 10.16) can transform floors into an impact-friendly, durable surface that also deadens acoustics." Whilst this has not at present been implemented within the new school, all the rooms are fitted with observation mirrors in the doors to enable staff to observe students and ensure their safety without invading their space. Pictures of the chill-out rooms in the new school can be seen below in Figure 10.17.

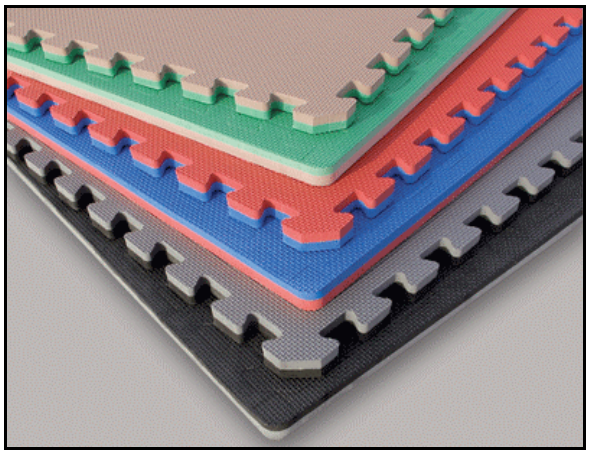


Figure 10.16: Foam tiles

Figure 10.17: Chill-out rooms in the new school

10.3.7 Interactive Whiteboard (IWB)

Identifying the Problem:

Engagement Scale Data

As illustrated in section 10.2, baseline collection of engagement data revealed that student engagement during group work was particularly poor as compared to student engagement during either independent work or 1:1 work. Additionally, student engagement was found to be especially poor during circle time as compared to other group activities and games. As discussed earlier, three previous modifications to the environment: new group / 1:1 table, new work chairs and new flooring, all served to

collectively improve student engagement by 17%, however the research team unanimously agreed that there was still further room for improvement.

Classroom Observations

The low level of engagement during group work revealed by the engagement data was corroborated through triangulation with classroom observations which revealed that during group work students were frequently observed to rock on their chairs, stare into space, become engrossed in repetitive behaviours, display disruptive behaviours and request to use the toilet.

Interviews & Questionnaires

One teaching approach and resource not currently being used in the research classroom was the Interactive Whiteboard (IWB). Staff responses during interview and questionnaires identified the *IWB being beneficial (9)* and *using the IWB (4)* to engage . students, particularly during group activities such as circle time. In addition, staff who did not have an IWB highlighted *wanting an IWB in the new school (6)*. Staffs' experiences included:

"The interactive whiteboard's brilliant …We use it a lot. I mean circle times are brilliant, they're really engaged in it. They wait for their picture and they go and write their name on, and so we're using that more and more now … We use the whiteboard a lot … It really engages all of them, I mean for all their different needs and different abilities, and the wide range, it really grabs all of them." (T7)

Memoing

MEMO (Interactive Whiteboard)

This identified problem correlates with the issue identified in the literature review, that consideration of the predominantly visual and kinaesthetic learning styles of students with autism will be crucial to developing a learning environment which supports them to engage as effective learners.

Planning:

Sections 3.2.4 explored in detail research which indicates that due to the sensory processing difficulties experienced by individuals with autism, "students with ASD have strengths in processing visual information in comparison to processing language or auditory information" (Hume, 2006, p. 4) and consequently have a strong preference for visual instruction over verbal (Mesibov, Shea & Schopler, 2004; Quill, 1997; Quill, 1995; Worth, 2005). In addition, section 3.2.2 discussed the implications of the 'broken mirror' theory of autism for learning, which suggests that for students with autism,

providing the opportunity for kinaesthetic learning so that students can 'learn through doing', is crucially important (Carpenter, 2007b; Hill, 2006; Konaka, 2007b; Konaka, 2007c).

This neurological evidence is supported by an abundance of research highlighting that:

> *"The majority of pupils with autism learn more effectively without additional verbal explanation or direction. The ideal situation seems to be where there is enough visual and/or kinaesthetic and haptic (from the movements involved and the feel of the task materials) information in the presentation of the task for the child with autism to be able to understand immediately how to tackle the task and when it is complete"* (Jordan & Powell, 1995, p. 74).

Consequently, teaching approaches and resources supplementary to the TEACCH approach, which would target the visual and kinaesthetic learning styles of these students were explored, in an attempt to improve the students' engagement during group activities.

Interactive whiteboard (IWBs) have been shown to provide a unique opportunity to meet individual students' learning styles through presenting auditory, visual and kinaesthetic opportunities for learning (Becta, 2003; Beeland, 2002; Bell, 2002; Cuthell, 2003; Davison & Pratt, 2003; Glover, Miller, Averis & Door, 2005; Higgins, Beauchamp & Miller, 2007; Wall, Higgins & Smith, 2005). For example, with reference to numeracy learning, the "kinaesthetic feedback they [students] get by using the drag and drop facility of the board can allow them to engage with … abstract concepts … [such as] numbers and letter sounds. They can, for instance, drag three objects into an area of the board with the number 'three' on it, reinforcing an exercise in numeral identification visually, kinaesthetically and auditorily" (Becta, 2006). Furthermore, it has been highlighted that the IWB "being simultaneously viewable by a whole class group, has an enhanced potential as a mediator of shared learning" (Egerton, Cook & Stambolis, 2009a, p. 14).

Additionally, research has consistently shown that IWBs are beneficial for improving the engagement and learning of students with special educational needs (Clark & Nordness, 2007; Cooper & Brna, 2002; Helms-Breazeale & Blanton, 2000; Lee & Boyle, 2003; Salinitri, Smith & Clovis, 2002), including physical disabilities (Speight &

Slater, 2006), ADHD (Jamerson, 2002) and autism (Egerton et al., 2009a; Egerton, Whitehurst & Cook, 2009b; Wilcox & Flaherty, 2007).

Action Step:

Based on this research and the experiences of the interview and questionnaire respondents outlined above, the decision was made to install a Smart IWB into the research classroom to enhance student engagement during circle time and other group activities.

Evaluation:

Classroom observations and staff feedback following the introduction of the IWB revealed that some students really enjoyed using the whiteboard, and were eager to participate in activities which involved the whiteboard. Subsequently, as illustrated in Table 10.11 and Chart 10.11, the installation of the IWB saw group engagement improve by a further 11%, resulting in group engagement rising from a poor 57% to a respectable 85% through the duration of the project, producing an impressive total improvement of 28%. Furthermore, engagement during circle time rose by 15% following the introduction of the IWB, and improved by a substantial 33% throughout the project (see Table 10.11 and Chart 10.11).

	Percentage Student Engagement (%)		
	All Group Work	**Circle Time**	**Group Games**
Baseline	57	49	70
New Table	68	63	74
New Chairs	71	68	79
New Flooring	74	67	82
Interactive Whiteboard	85	82	87

Table 10.11: Student engagement during group work following IWB

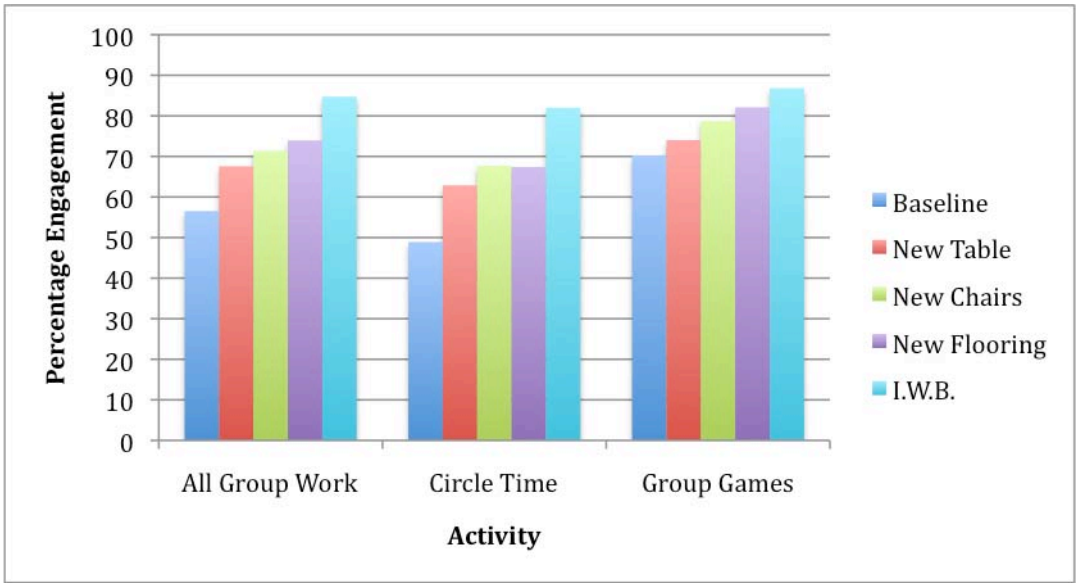


Chart 10.11: Student engagement during group work following IWB

In addition, the whiteboard was also found to be unexpectedly robust, withstanding substantial physical abuse from the students. This observation was supported by a teacher interviewed who commented that:

"They do tend to bash it a bit, but it's more durable than we expected, we thought it would be in pieces after a few days." (T11)

Despite the observed improvements in engagement, classroom observations also identified a few issues with the IWB. Firstly, when students were positioned directly in front of the whiteboard in order to use it, this interfered with the beam from the projector, and consequently they were only able to see their own shadow and not the information on the IWB screen (see Figure 10.18). Consequently, some students struggled to understand how to use the whiteboard and became stressed when asked to use it.

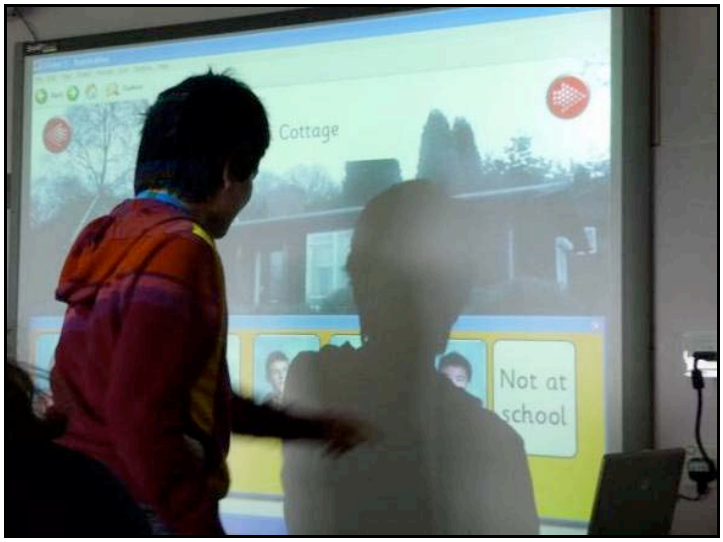


Figure 10.18: The shadow created on the IWB

To address this issue, alternative IWB screens and projectors were researched. One possible alternative was to use a plasma screen whiteboard, as these do not suffer from the shadow issues experienced with the Smart board. However, when the students from the research classroom went to trial the plasma screen in another class, it was observed that the screen was not as robust as the IWB, and staff were concerned that students who hit the screen hard may break it. Additionally the plasma screen was found to be significantly more expensive than other whiteboards. Nevertheless, two alternative methods were identified to eliminate the shadowing, which are to utilise either a sharp-angle projector or a back-lit projector, both of which do not create shadowing. This is promoted by Egerton, Cook & Stambolis (2009a, pp. 66-67) who state that "the projector should ideally be mounted as close to the IWB as possible to reduce shadowing of the image … students who have an ASD may not instinctively make appropriate compensatory body movements to … avoid casting a shadow." Thus, for the new school, sharp-angle projectors were considered to be the most suitable option since they are easy to install. Photos of sharp-angle projectors in the new school can be seen below:

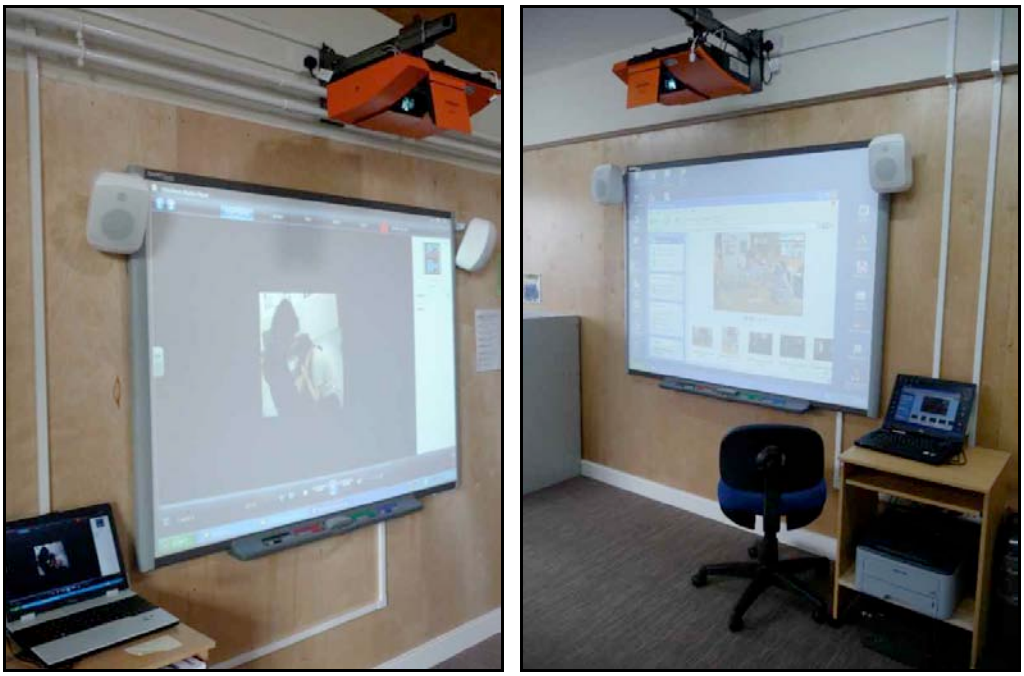


Figure 10.19: Sharp angle projectors in the new school

In addition to this, classroom observations, interviews and questionnaires also revealed that the positioning of the IWB is crucial, with *sunlight affecting IWB (1)* since any direct sunlight shining in through a window will cause the image to fade out. For example one teacher commented that:

"The sunlight affects the IWB. It just fades out altogether. I guess you could put it directly on the window, that would be the only way." (T11)

This issue is also acknowledged by Egerton et al. (2009a, p. 9) who highlight that, "light from other sources, such as windows, skylights, direct sunlight or electric lights − can lead to a less distinct image on the IWB or surface glare. The IWB should be positioned out of line with a direct light source." To address this issue in the new school, great care was taken to ensure that the whiteboards were not installed on walls directly opposite windows. A further issue identified through the interviews and questionnaires was that staff identified *needing more time / training to use IWB effectively (5).* For example, they commented that:

"I just feel like I've scratched the surface of it really. For the amount I use it and the amount of good it does, I think if I knew a lot more, it's just like a key to another world really." (T7)

To address this issue the research school undertook a research project to identify effective resources and training requirements for IWB use, and subsequently provided

IWB training sessions to any teachers who wished to attend (see Egerton et al., 2009a; Egerton et al., 2009b).

10.3.8 Intensive Interaction (II)

Identifying the Problem:

Engagement Scale Data

Baseline engagement data revealed that the students' social engagement during choice time was extremely low. Whilst students were spending a respectable 52% of their time authentically engaged with materials, students were spending an extremely small minority of choice time – only 3% - interacting with either staff or peers (see table 10.12 and chart 10.12).

Interviews and Questionnaires

During interviews and questionnaires, some staff at the research school discussed *TEACCH limiting opportunities for social interaction (5)*. For example, one interview respondent commented that:

"I've come across something fairly recently highlighting a problem with using TEACCH and wanting to develop expressive communication." (FI4)

In addition, interviews and questionnaires revealed that a number of staff at the school were already *using / wanting to use II / interactive approaches (21)*, either as a main teaching approach or in conjunction with TEACCH and other methods. Furthermore, many staff highlighted the importance of *providing a responsive environment (5), II encouraging communication and/or engagement (10)* and *II calming (2)* students. For example, respondents commented that:

"The fact that the students know that they can approach us and they'll get an interaction, I think that's made a really big difference to them all. You know, they're nowhere near as autistically sort of isolated and withdrawn as they were, and I think that's partially down to the fact that they know they're gonna get a response from us." (T6)

Furthermore, a number of respondents highlighted the importance of *staff being willing to get down to the students' level, follow students' lead and give students a degree of control over their learning (11)*, for example:

"Their learning needs to be much more led by them and much more them interacting with us and the environment in order to engage them …it's an approach that puts it all back in control of them really, they can interact with us when they want to, we try to put very little pressure on them … we let them dictate, and I think that's given them… a way of accessing learning that they possibly didn't have previously." (T6)

Memoing

MEMO (Intensive Interaction)

This identified problem also correlates with the issue identified in the literature review, that in order to address the social impairments characteristic of autism, an effective educational environment for this population of students must aim to increase the salience of the social world for students with autism through a responsive and interactive style of teaching in order to promote both their social and academic engagement.

Planning:

As highlighted through sections 3.2.1, 3.2.2 and 4.1, students with autism experience significant social impairments, and consequently "many children with ASD have been unable to engage fully in the experiences necessary to enable them to develop even the very basics of social interaction and communication" (Konaka, 2007c, p. 37). Furthermore, this lack of social engagement holds the potential to negatively impact all further development and learning (Keen, 2009). It is therefore increasingly being recognised that "anything that can strengthen communication interactions, and the connection of the child with ASD to another human being is to be encouraged" (Carpenter, 2007b, p. 160).

As highlighted in sections 4.1.3 and 5.1.2, a responsive approach has been shown to be effective at improving the social engagement of students with autism (Kishida & Kemp, 2009; Mahoney & Perales, 2003; Mahoney & Perales, 2005; Mahoney & Wheeden, 1999; Mahoney, Wheeden & Perales, 2004; Wimpory, Hobson & Nash, 2007). To this end, a number of approaches which emphasise a facilitative or responsive style to enhance the pre-speech and early social skills of students with ASDs, including Sherborne Developmental Movement (Konaka, 2007a; Konaka, 2007b; Konaka, 2007c), interactive play (Thornton & Taylor, 2007) and Intensive Interaction (Nind, 2000; Swinton, 2008) are used within the research school.

Intensive Interaction, the approach highlighted by a number of respondents, is a classroom-based approach built upon the premise of a responsive teaching style, and was developed to address the needs of individuals who are still at very early stages of social and communication development (such as those with profound autism) (Hewett, 1994; Nind, 1993). II is a relaxed, non-directive and responsive approach in which the learner leads and directs interactions and the teacher responds to and joins in the behaviour of the learner. The aim of II is that as interaction sequences are repeated,

the fundamentals of communication are gradually rehearsed and learnt in a free-flowing manner. Studies have shown that II has been successful in enhancing the social and communicative development of many individuals with ASDs within a classroom setting (Kellett & Nind, 2003; Nind & Powell, 2000; Nind, 2000; Swinton, 2008; Watson & Fisher, 1997).

Action Step:

As such, a further modification implemented within the research classroom was the introduction of II as an option during choice time. To facilitate this, II training was provided to all the teaching staff working in the research classroom.

Evaluation:

As illustrated in Table 10.12 and Chart 10.12, student engagement following the introduction of II into the classroom did not change significantly. Students continued to spend extremely limited amounts of time socially engaged with either other students or staff, with an increase of only 2%. Furthermore, whilst time spent non-engaged decreased by 4%, time spent ritualistically engaged increased by 4%. Possible explanations for the limited positive influence of the introduction of II into the research classroom will be discussed during the conclusion in chapter 12.

	Percentage Student Engagement (%)	
	Prior to I.I. Training	**After I.I. Training**
Authentically Engaged with Materials	52	50
Authentically Engaged with a Person	3	5
Ritualistically Engaged	14	18
Non-Engaged	31	27

Table 10.12: Student engagement during choice time prior to and after II

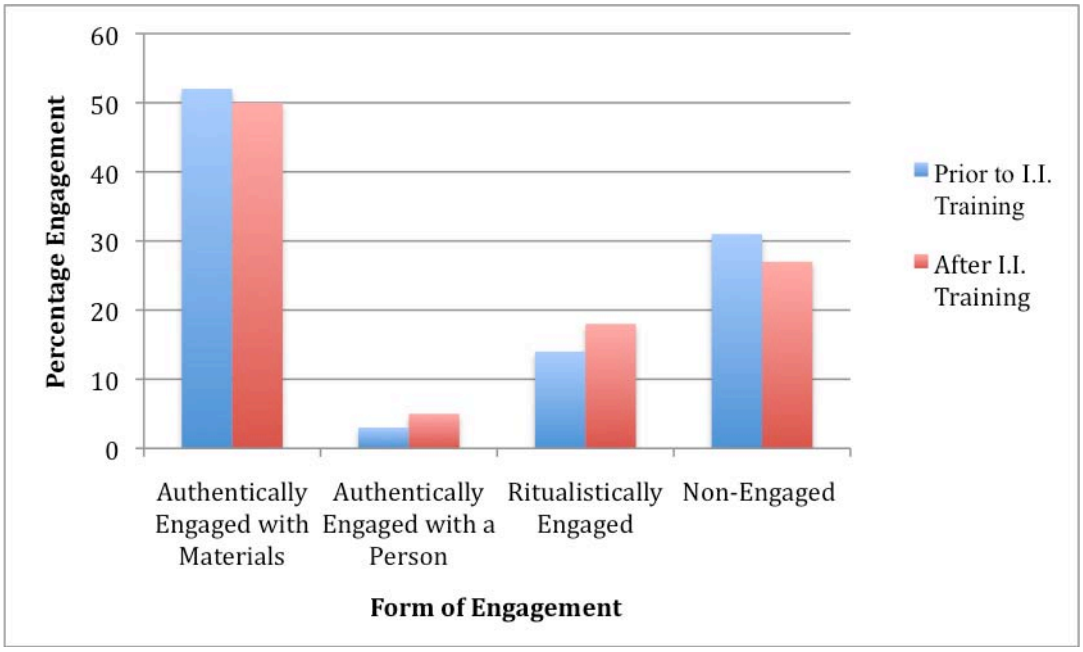


Chart 10.12: Student engagement during choice time prior to and after II

Reflexive Journal Excerpt

. . .It is certainly disappointing that the Intensive Interaction intervention was unsuccessful. My personal opinion is still certainly that using a combination of teaching approaches including employing a responsive style of interaction is beneficial when working with students with autism, an opinion supported by an abundance of research. However, from this intervention it is clear that there are a number of extraneous factors influencing the implementation of a particular teaching style within a classroom which require consideration when attempting to assess the effectiveness of such an intervention. . .

10.4 Conclusion

In conclusion it can therefore be seen that a number of issues affecting student engagement were identified and modifications trialled during the second year of this project. These were:

No	Modification
1	Bespoke group / 1:1 table
2	Bespoke independent workstations
3	School chairs
4	Separate choice room
5	Sound-absorbent flooring
6	A chill-out room
7	An IWB
8	Intensive Interaction

Table 10.13: List of modifications trialled in phase 2

All but one of these modifications were observed to improve the student's engagement in learning and/or their behaviour within the classroom. The final modification, the introduction of Intensive Interaction, was not successful, and possible reasons for this will be discussed in chapter 12. A summary diagram providing an overview of the entire PAR meta-spiral which occurred through this research is presented in Appendix 10.

CHAPTER 11

RESULTS – PHASE 3

11.0 Overview

The results discussed in chapters 9 and 10 clearly outline the benefits of the adaptations to the learning environment trialled throughout phases 1 and 2 of this research project. The modifications introduced during the course of these PAR phases were:

No	Modification
1	Robust chair upholstery for soft classroom chairs
2	Robust 'boxed-in' toilet facilities
3	A before-school exercise routine and provision of an exercise bike in the classroom
4	Rocking chairs
5	Modern daylight fluorescent electronic ballast lighting with louvers
6	Matt laminate
7	Bespoke group / 1:1 table
8	Bespoke independent workstation
9	Anti-tilt classroom chairs
10	A separate choice room / split room classroom
11	Sound-absorbent flooring
12	A chill-out room
13	Interactive whiteboard
14	Intensive interaction

Table 11.1: The modifications trialled through phases 1 and 2

Nearly all of these modifications were observed to improve the student's engagement in learning and/or their behaviour within the classroom. Following the end of the PAR phase of this project, the 6 students in the research classroom were provided with the opportunity to directly offer their views on the modifications trialled throughout the course of the research through the use of cameras and Talking Mats. The results from these shall be discussed at the beginning of this chapter.

In addition, following the completion of the PAR phase of this research there were further modifications to the physical learning environment, identified through the interviews, questionnaires and classroom observations, which for logistical or financial reasons it was not possible to trial within the research classroom. These shall now be discussed as phase 3 of the project. Furthermore, as anticipated during the literature

review, many important issues relating to the teaching approach and resources and the people in the environment were also raised during the course of this research as factors which affect student engagement.

The teaching approach and resources were investigated to a degree through the introduction of II and an IWB into the research classroom. However, since the focus of this research was primarily the physical environment, these areas were not investigated in any detail through the PAR approach employed. Nevertheless, this chapter will highlight additional issues relating to these areas raised by the staff at the research school through the interviews and questionnaires.

11.1 Student Voice

As discussed in section 7.7, the decision was made to obtain students' views directly regarding their learning environment through providing them with specially adapted visual methods to evaluate the PAR phase of the research. To this end, students were given a disposable camera and visual instructions to take pictures of things in the classroom which they like. In addition, students were presented with Talking Mats, and asked to place photographs of modifications introduced into the classroom under either 'like' or 'dislike'. Students were supported to undertake the tasks by teaching assistants in the research classroom who knew them well, since it was felt that as highlighted by Beresford (1997) the adults involved in consulting children with disabilities should be known, familiar and trusted.

Staff feedback suggested that the camera activity was fairly successful, and that the students largely understood and enjoyed participating in this activity. Only one student was felt not to understand this task, and thus staff decided to withdraw this student from the activity. For the remaining 5 students, the photographs that the students took support the staff feedback that they understood the task, since all the students took photographs of items within the room which were known to be highly motivating to the students, such as the TV, CD player and computer. Based on this, the photographs the students took can be considered to provide a useful insight into the students' voices regarding what they like about their learning environment. Table 11.2 below provides a summary of the aspects of the learning environment which the students chose to take photographs of. Some of the photographs students took are presented in Figures 11.1, 11.2, 11.3 and 11.4.

Student	Photographs taken
Jane	- Television - Choice room (x5) - Observation mirror (x2) - Peers and staff - Group / 1:1 table (x2) - Sink - Lunch menu - Computer - Rocking chair
William	- Group / 1:1 table - Peers and staff - Rocking chair - Choice room - Computer (x2)
Simon	- Reading books (preferred choice activity) (x7) - Independent workstation / choice area - Interactive whiteboard - Work chair - Rocking chair - Observation mirror - Computer - Transition symbols (x2)
Liam	- Independent workstation - Television / CD player - Flooring - Modern fluorescent lighting - Work chairs - Staff / peers
Claire	- Television - Drawing pad (preferred choice activity)

Table 11.2: Student voice photographs

"I like the interactive whiteboard"

"I like the school chairs"

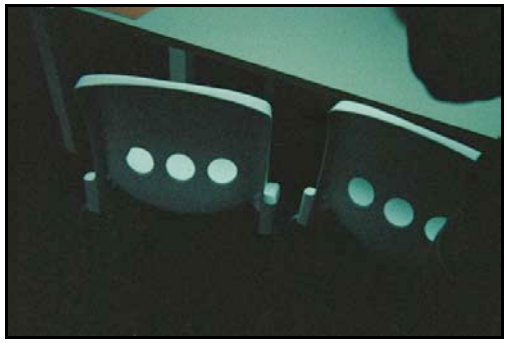
Figure 11.1: Photographs taken by Simon

"I like the rocking chair" "I like the group table"

Figure 11.2: Photographs taken by Jane

"I like the choice room" "I like the computer"

Figure 11.3: Photographs taken by William



"I like the carpet" "I like the school chairs"

Figure 11.4: Photographs taken by Liam

Despite the success of the cameras, the teaching staff felt that 5 of the 6 students did not fully understand the Talking Mat activity, and commented that whilst the students

appeared to enjoy looking at the photographs provided for the Talking Mat activity, they did not understand what was being asked of them, and were observed to place the photographs alternately under the two columns of “like” and “dislike.” Consequently for 5 of the students this task failed to provide a useful insight into their views. For the one student who was felt to understand the activity, his Talking Mat revealed that the elements of the learning environment which he disliked were the original group table, the original school chairs, and the original soft chair (see Figure 11.5). Whilst this feedback is inconclusive, it does nevertheless suggest that for these elements of the learning environment, this student preferred the modified versions introduced into the classroom.

Figure 11.5: Talking Mat by Liam

In summary, while the camera task provided a useful insight into the students’ views regarding their learning environment, and suggested that the students liked many of the modifications trialled, the feedback gained from the Talking Mat activity was limited due to the students’ lack of understanding of the task. However, as highlighted by Rodgers (1999, p. 427):

> *“Being able to hear the direct opinion of a person with learning difficulties, uninfluenced by the presence of a carer, is very valuable and it is worth missing some information to attain it. It seems important not to completely dismiss a person's ability to take part in research on the basis of some invalid answers.”*

Nevertheless, the inconclusive nature of the results obtained from the student voice activities does serve to highlight the importance of utilising the Mosaic approach to ensure that students' views are corroborated through observation and discussion with other relevant individuals when undertaking research aimed at obtaining the views of students with profound autism.

11.2 Phase 3 Results

The results from the third phase of this research shall now be presented.

11.2.1 Toilet / Washing Facilities

In addition to the issue of robustness raised in section 9.4.2, whilst the research classroom was lucky to benefit from a toilet accessible from within the classroom and of a suitable size for changing students when necessary, this was not the case for all classrooms. Consequently, the interview and questionnaire respondents raised additional concerns regarding *needing suitable toilet facilities (13)* in the school. Their comments included:

- ***Needing toilets accessible from the classroom (6)***

"Not having to go out of the classroom for toilets is really good." (T5)

- ***Toilet areas being adequate size (3)***

"*Toilet areas need to have plenty of space, sometimes you need two people changing someone. So big disabled-size toilets, like you see at the cinema, so you've got privacy but space."* (T7)

- ***Needing a shower (1)***

"We don't have a shower in here, and one of the students needs to be washed after going to the toilet, so we have to take him back on to house every time he needs the toilet, so that's a problem." (T5)

- ***Water supply needing to be under control of staff (3)***

"Some students have water fixations so … there's got to be some sort of barrier there, that prevents the students from getting to it [the water] … or some sort of tap that has got a control on … there's got to be some sort of control with water" (T13)

MEMO (Toilet facilities, part 2)

These additional issues raised with regards to toileting facilities reiterate:
a) the importance of considering the prevalent toileting issues of students with autism when designing educational environments for this population of students which staff emphasise necessitates suitably wide toilets and available showers.
b) the importance of considering common stereotypical behaviours such as obsessions with water,
c) the importance of considering health and safety aspects and the students' lack of sense of danger
In addition, this 'problem' also raises a new issue, that of the importance of providing an environment which facilitates student independence. Due to the difficulties and needs experienced by the students at the research school the majority have a high level of care need. Consequently, supporting them to be as independent as possible is a high priority to develop self-help skills and raise self-esteem.

The importance of providing accessible toilets is now widely accepted, with all new builds required to provide wheelchair-accessible facilities in compliance with the Disability Discrimination Act (1995). However, for individuals without physical disabilities, the importance of these requirements often continues to be overlooked. Nevertheless, Harker & King (2002, p. 99) recognise that when designing buildings for people with special needs:

> *"The need to offer personal support, supervision, and training in aspects of hygiene requires that at least some WC pans, hand-basins, showers and baths are positioned so that staff assisting can stand beside the person they are helping; any general use bathroom or WC must provide this additional space."*

The need for a shower to wash students after they use the toilet is related to the difficulties faced by many individuals with autism with regard to toilet training, which was discussed in section 9.4.2. The importance of having a shower available to assist with toileting is highlighted by Plimley & Bowen (2006, p. 12) who state that "we were lucky to have a shower room with toilet plus an additional separate toilet in the building" in an educational facility for secondary school students with autism. Furthermore, considering the extent of the toileting issues faced by individuals with autism, it would seem important to ensure that the bathroom is a low-arousal environment in order to help reduce anxiety.

The issue of individuals with autism frequently having obsessions with water is highlighted by the NAS who acknowledge that "our autism helpline often receives calls about people with autism who have an obsession with water" (Nguyen, 2006, p. 13).

They also recommend that “it is also helpful to adjust your water temperature so that it is not too hot” (Nguyen, 2006, p. 14).

In order to address these issues, the new school was designed such that:

- all classrooms have easy access to two toilets from within the classrooms
- toilet facilities were neutral coloured to promote a low-arousal environment
- some classrooms have wider disabled access toilets for changing incontinent students
- some classrooms have access to a shower room
- the teachers are able to control the water supply by adjusting the flow rate and temperature of the water, and turning off the water supply if necessary

Pictures of the toilets in the new school are shown in section 9.4.2. A photo of a shower room in the new school can be seen below in Figure 11.6.

Figure 11.6: Shower room in the new school

11.2.2 Classroom Size

Many of the interview and questionnaire respondents discussed the issue of having an appropriately sized classroom. The majority of feedback highlighted *needing large classrooms (36)* and suggested that large spacious rooms were necessary to ensure that students are not overcrowded and on top of each other, and have enough space to co-exist harmoniously without invading each other's space. For example they commented that:

"It is a large classroom. 14 to 17 year olds need a fair amount of space you know. There's 5 of them in here, so yes I mean it's a nice open space for them, they're not on top of each other." (T1)

It was clear from these comments that they considered it important for classrooms to be sufficiently spacious. Some respondents also commented about safety issues arising from their current classrooms due to difficulties in supervising students dispersed amongst various small rooms, or due to their *classrooms being too small (10)*, especially once fitted with the large amount of furniture required to structure up the environment for the students. Such comments included:

"There's some classrooms that I teach in that I find horribly claustrophobic, and quite frankly I think they're unsafe because you've got a massive massive group table with chairs all around, and then you've got screens everywhere, and if a student's distressed, it's difficult to get the other students out of the way, so you're tripping over chairs, tripping over people." (T13)

Nevertheless, despite the general emphasis towards large spacious classrooms, some teachers did broach the issue of *students struggling with very large spaces (4)* and finding them particularly daunting and stressful. For example:

"Classrooms are going to be bigger, so my concerns are, are they going to be too big? Because these students can't cope with lots of space." (T12)

MEMO (Classroom Size)

The issues raised with regards to classroom size further emphasise previous considerations identified through past problems:
1. Consider the sensory difficulties experienced by individuals with autism – in this case tactile and proprioceptive dysfunction resulting in a disinclination to be close to / touching others and a resulting dislike for small and confined spaces.
2. Consider health and safety issues regarding having spaces suitable to supervise students and sufficient space for both students and the necessary furniture
3. Consider the teaching approaches to be used – physical structure necessitates large amounts of furniture and thus requires plenty of space

These contrasting opinions regarding optimal room sizes and spaces for individuals with autism are also apparent through the literature. Henry (2006), identifies that consideration of spatial elements is crucial when developing a learning environment for students who may have vestibular or proprioceptive difficulties, however opinions contrast as to whether large or small spaces are the most desirable. Many individuals with autism describe that they experience a sense of fear which can overwhelm them in large busy environments, whilst that they feel a sense of security and safety from smaller spaces. According to Temple Grandin, large, busy and unfamiliar environments often make her feel scared and disorientated, and as a child she frequently "wished for a small cubby hole" (Grandin & Scariano, 1996, p. 37). The view that smaller facilities can help prevent these fears is also held by Myler et al. (2003, p. 1) who suggest that "an appropriately scaled facility can help prevent this. Ceiling heights must be kept low, spatial volumes small, and learning spaces intimately proportioned."

However, in contrast, Humphreys (2005) and Beaver (2006) both support the provision of larger environments. Humphreys discusses the issue of 'proxemics' – the amount of space between an individual, elements of their environment and other people in their environment, and 'proximity' – the amount of personal space a person requires to feel safe and comfortable. Humphreys argues that individuals with autism are frequently more guarded about their personal space, and can see its invasion as particularly threatening, stating that "people with autism are more sensitive and more threatened by a want of space and react accordingly" (King & Harker, 2002, p. 94). He therefore suggests that spaces designed for individuals with autism should be as large as possible.

This view is reiterated by Maxwell (2006a, p. 14), who states that:

> *"Crowding has negative effects on human beings. In addition to cognitive fatigue, the perception of being crowded elicits an emotional response, with feelings of stress, which may contribute to poor mental health. Feeling crowded may also elicit behavioural responses such as aggressive behaviour in children and adults, disruptive behaviour in children, social withdrawal and/or departure."*

Furthermore, Maxwell goes on to highlight that students "with more significant intellectual and developmental disabilities, including the autism spectrum conditions, may exhibit exacerbated aggressive and disruptive behaviours in response to either a decrease in space per child or an increase in class size" (Maxwell, 2006a, p. 15).

The importance of providing individuals with autism with spacious buildings is also highlighted by Beaver (Beaver, 2006, p. 4) who outlines that “there is no doubt that the children feel liberated by the sense of freedom this space offers them.” This is also the view expressed by the Department of Health who advocate that “limited personal or communal space is unsatisfactory, especially if you have an ASD. If a building is generous with space people manage better” (DoH, 2006, p. 43). Furthermore, as discussed in section 9.4.5, the classroom observations following the introduction of the ‘Leca’ furniture in phase 1 of the project revealed that it is essential for the students to have a sufficient amount of personal space and distance between each other in order to promote appropriate interactions with their peers, prevent them from winding each other up, and enable them to engage as effective learners. Within the new school the decision was made for the classrooms to be large. A classroom in the new school can be seen below in Figure 11.7.

Figure 11.7: A classroom in the new school

11.2.3 Room Temperature

Many of the interview and questionnaire respondents discussed *room temperature affecting students (15)*, the fact that their classrooms frequently reach extreme temperatures, *classrooms being too hot / cold (10),* and the difficulties which can arise from this such as students finding it difficult to engage and concentrate, and increased incidents of challenging behaviour. For example:

“The temperature of the room can prevent them from engaging … in the afternoon, when this room gets hot, the environment’s got an effect on how much they can concentrate” (T1)

MEMO (Room Temperature)

This identified problem suggests that as with the impact of toileting issues, interoceptive dysfunction common in autism must be considered in the design of educational environments for students with autism, in this case due to the resulting temperature self-regulatory difficulties.

Some respondents identified large south facing windows as the main cause of the extreme temperatures within the classrooms, *room temperature rising due to sun shining in (5)* for example:

"They need to consider those big windows in the existing building where the sun in the summer is just unbearable because it just gets so hot." (T4)

According to Jaakola (2006, p. 46),

> *"Thermal conditions – temperature, relative humidity, and air velocity – constitute the thermal environment and play an important part in the school environment. The thermal environment has direct effects on the human body and on functional outcomes such as performance, learning, and productivity."*

This may be particularly relevant to the student autism, since as discussed in sections 3.2.3 and 3.2.4, the body's ability to regulate body temperature, and its response to external temperatures can be affected by inetroceptive dysfunction. Consequently ensuring environmental control of temperature is particularly important for this population of students to facilitate effective engagement and learning.

As outlined by the comments above, the major contributing factor to the high room temperature experienced in the classrooms is the sun shining in through windows. One possible solution identified to resolve this issue would be to utilise blinds, and some staff commented about *blinds being needed to block sunlight (6)*, for example:

"I have used blinds to reduce direct sun-light" (R2)

However, one respondent continued to clarify that to provide the best protection from the sun, blinds must be made from black-out material:

"We do pull the blinds down, but they're not black out blinds, they don't do enough." (T11)

Additionally, unfortunately blinds themselves present their own issues within classrooms for students with ASDs, with *blinds distracting students / being pulled down (3)*:

"With blinds, sometimes you have the problem of the kids playing with them and rattling them and shaking them and pulling them up and down, and that's a big distraction." (T7)

Following research into this area, the researcher identified some options which would be suitable for use within classrooms designed for students with ASDs. One option would be a blind known as an integrated blind, or integral blind, which lies within the cavity of double glazed windows and can be installed in all new windows. Such a system would eliminate the health and safety and distraction problems discussed by the teachers. Furthermore, such systems provide enhanced sun shading and an improved level of UV protection as compared to standard external blinds. In addition, a variety of different control mechanisms are available, including remote operated and solar operated, thus enabling the installation of a system which only the teachers can operate (Uniblind, n.d.).

The use of such systems is also promoted by Farmer (n.d.), who states that "many window manufacturers offer sleek and functional options for window treatments that are actually positioned between the double glass panes; offering privacy and light control, without the hazards of exposed blinds and shades." Unfortunately for financial reasons it was not possible to install the integrated blind system in the new school. Instead an external canopy was installed to shade south-facing windows from the sun. Specially designed blinds were installed which did not have strings and can be easily put up and down as and when required, however unfortunately for financial reasons these were not made from black-out material. Photographs of the canopy and blinds used in the new school are shown below in Figure 11.8 and Figure 11.9 respectively.

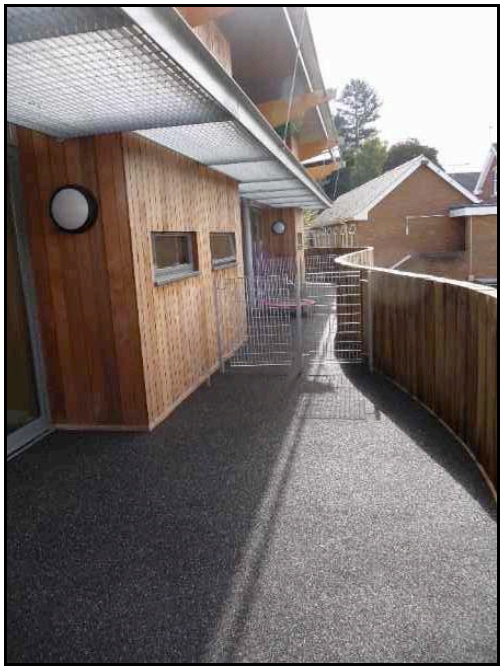


Figure 11.8: Canopy shading classrooms

Figure 11.9: Blinds shown rolled up and partially pulled down

11.2.4 Sunlight

An additional difficulty arising from the sun shining through classroom windows is *sunlight affecting students (7)* and *reflection of light affecting students (3)* due to the distraction caused by the bright light, which can prevent students from successfully engaging in work. For example, teachers commented that:

"This window is really quite light, especially on an afternoon when the sun just bares in, that can be a distraction." (T4)

MEMO (Sunlight)

This problem reiterates the theory implied through many previous identified problems – that to develop a learning environment which supports students with autism to engage as effective learners it will be necessary to consider their sensory dysfunction. In this case it is important to adapt the environment to accommodate visual sensitivities through reducing the distraction and discomfort caused by bright sunlight.

As discussed above, the integrated blind system would also help resolve this issue.

11.2.5 Window Views

In addition to the issues arising from sunlight pouring in through a classroom, since students with autism are easily distracted by an overly stimulating visual environment, another difficulty discussed by the interview and questionnaire respondents was that of *students being distracted by window views (6)*. For example, teachers commented that:

"Windows are a distraction. I've got one student who looks out to the trees when it's sunny because of the shape of the patterns and the light. That really distracts him so I have to face him away from the window so he faces into the classroom, because if he faces out of the room he looks out and looks at all the pretty patterns and the leaves on the trees." (T5)

MEMO (Window views)

As with other identified problems, this issue again reiterates the importance of considering the sensory dysfunction experienced by individuals with autism in order to enhance their engagement in learning, in this instance through reducing sensorily overloading aspects of the environment such as visual distractions.

To resolve such difficulties, one teacher mentioned *using frosting on windows to block distracting views (1)*:

"You'll see in some of the classrooms we've got frosting on the windows. As long as it lets in enough light so that you don't have to have horrible fluorescent lights, I think that would be a good idea." (T5)

However, the same teacher did continue to clarify that permanently obscuring the view is not always beneficial for the students due to *students using window views to orient (1)*:

"I don't like to completely shut out the views because some of the things that go on in the day give the students a clue as to what time it is, like when they see all the children coming up from their walk, they know it's the start of the day, and when they see people pushing the red trolley down they know it's nearly time for lunch, and a lot of the children in my class use that as a cue." (T5)

Another teacher discussed the benefits of *high-level windows preventing distraction (1)*:

"Where these windows are is a good idea, because they add a bit of extra light but they are high up and they don't cause distractions, you don't get people staring out the window looking at what's going on. So they're a good idea." (T7)

It is therefore clear that windows present a problematic distraction for many students with ASDs. Utilising high-level windows would go some way to reducing distractions, however, as mentioned by one teacher, the sunlight streaming through can still be an issue:

"The windows up there, I've painted those in, to cut down on the sun and light coming in. At one time anybody sitting along that side of the table had a stream of sunlight first thing in the morning, straight over them." (T11)

One possible solution which would enable high level windows to be used successfully would be to utilise photochromatic glass which automatically darkens when exposed to ultraviolet light. However, windows also provide an important source of natural lighting, and providing only high-level windows would drastically limit the natural lighting within the classroom. Comments surrounding natural lighting shall be discussed in the following section.

In order to ensure natural light is available if and when needed, once again a possible solution would be to install integrated blinds which could be shut when necessary to block distracting views, and opened when natural light is required.

11.2.6 Natural Lighting

Many interview and questionnaire respondents highlighted *classrooms needing large windows/ natural light (14)* in order to provide an optimal learning environment for students with ASDs. Their comments included:

"I'd love somewhere lighter and a bit more open so that I don't have to use so much unnatural light, because I hate that." (T5)

Natural lighting has been shown to be hugely beneficial for the provision of an effective learning environment. Studies have found that students in classrooms with more daylight progress 20% faster in numeracy and literacy skills than those in classrooms with less daylight (Heschong Mahone Group, 1999). Of particular benefit is the fact that the more natural lighting there is in a room, the less artificial lighting is required. This would likely be particularly important for students with autism in order to reduce any visual discomfort caused by artificial light.

MEMO (Natural light)

This identified problem again reiterates the importance of considering the sensory dysfunction experienced by many individuals with autism when developing an optimal learning environment for this population of students. In this case this necessitates maximising natural light in the classroom.

However unfortunately as also discussed, large windows bring with them associated problems of increased glare, distraction and room temperature. Within the new school the decision was made to provide plenty of large windows to provide natural light, with the addition of the blinds shown above to reduce visual distractions and block sunlight when necessary. The large windows installed in the new school can be seen below in Figure 11.10.

Figure 11.10: The large windows in the new school

An additional solution to increase the amount of daylight within a room without the associated difficulties arising from large windows is the use of tubular skylights. Sunlight is channelled through the tubes and diffused across the classroom, which

"spreads the daylight across the classroom, minimising hotspots and glare" (Erwine, 2006, p. 29). In addition, using a combination of windows and skylights allows for daylight to enter the classroom from multiple directions, which has the added bonus of minimising shadows and balancing the light evenly across the room, in addition to reducing the amount of artificial light required (Erwine, 2006). These tubular skylights were installed within the new school, and pictures of them can be seen below in Figure 11.11.

Figure 11.11: Tubular skylights within the new school.

11.2.7 Ventilation

Another issue related to windows is that of ventilation within the classrooms. Many interview and questionnaire respondents made comments surrounding *classrooms needing ventilation (7)*. For example:

"Ventilation in these rooms is another important thing. They've got to put in some good ventilation because we're in an oven, we're cooking. It has been a very mild summer's day today and you still feel the heat." (T11)

MEMO (Ventilation)

As with the problem of room temperature, this identified problem reiterates the importance of considering the interoceptive dysfunction common in autism, in this case through ensuring adequate ventilation to provide adequate environmental control of temperature and alleviate issues arising from temperature self-regulation difficulties.

According to research, students in classrooms with easily accessible natural ventilation through operable windows perform 7% better than those in classrooms without natural ventilation (Heschong Mahone Group, 1999). This may be particularly important for

students with autism due to their temperature regulation difficulties. A key consideration when designing learning environments for students with autism is thus to be aware of the need to ensure that appropriate facilities are available to maintain optimal temperature conditions within the classroom to ensure student engagement and behaviour is not adversely affected by extreme heat or lack of air.

One method which is regularly employed to deal with elevated room temperature and lack of ventilation is to open windows and improve air flow. Some teachers commented about *windows needing to open for ventilation (5),* stating that they were able to utilise this successfully within their classrooms, for example:

"In the summer it's generally not too bad, we get a nice sort of flow through with both sets of windows being open." (T6)

However, for students with autism open windows can present additional distractions, due to *students posting things through opening windows (1)*:

"If we have opening windows, they're continually opening those and posting stuff." (T11)

Alternative solutions to regulating room temperature and ventilation which were being used in some classrooms at the school were the use of high-level opening windows, *using fans for ventilation (1)* and *classrooms needing air conditioning units (3)*. Some of the benefits and drawbacks of high-level windows were discussed in section 11.1. Nevertheless, opening high-level windows have the potential to be extremely useful as a source of air flow which is out of reach of the students so they can not post items out the window or climb out themselves.

Regarding the use of fans, the issue of *fans only circulating hot air (1)* was raised:

"We had a fan, but it's very old, and it only circulated the hot air that was in the classroom anyway." (T9)

When discussing air conditioning units, respondents highlighted the issue of *portable air conditioning units being noisy (1)*:

"We have had an air conditioning unit that they've put in that we used in the summer last year, and that was great, but it's really noisy because it was one of the ones you plug into the wall and it just sucks warm air out and drags the cold air in, so that's not ideal, so a proper incorporated air conditioning system would be really nice." (T1)

It is therefore clear that it is essential for classrooms catering for students with ASDs to benefit from temperature and ventilation regulation systems in order to support engagement and reduce challenging behaviour. However, since many portable systems tend to be extremely noisy, it is important that the necessary planning is undertaken and funding is available to ensure that classrooms are fitted with suitable permanent HVAC (Heating, Ventilation and Air Conditioning) systems. Unfortunately, within the new school, ventilation issues were not particularly well addressed. For financial reasons an HVAC system was not installed. Consequently classrooms are still using free-standing fans and noisy portable air conditioning units to help control the room temperature (see Figure 11.12 below), and it was necessary for low-level windows to be opening to provide air-flow (see Figure 11.13).

Figure 11.12: Low-Level opening windows

Figure 11.13: Free-standing fans in the new classrooms

When designing an appropriate learning environment for students with ASDs, it is therefore clear that particular consideration must be given to the compromise required between the need to provide sufficient natural light and air-flow, whilst limiting:

- sunlight pouring into and heating up classrooms
- students being distracted by external views, and
- students posting items through open windows

Where financially viable, one possible solution to reaching a successful compromise would be to install the integrated blinds discussed earlier. These could be lowered to block out distracting views or sunlight when necessary, but could also be raised to increase the level of natural light within the classroom when required. When combined with high-level opening photochromatic windows and a central HVAC system, this could provide the ideal solution for maintaining optimal room temperature and ventilation, whilst reducing distractions and allowing sufficient natural lighting within the classroom. However unfortunately there are significant financial implications for this solution. Nevertheless, integrated blind systems have been effectively installed within other purpose-built buildings for individuals with autism, including the JCoSS Pears Educational Resource Provision, London, and Ty Nant living service, Newport City.

11.2.8 Artificial Lighting

As discussed in section 9.4.3, due to their sensory dysfunction, many students with autism are highly sensitive to traditional fluorescent lighting. Many of the issues associated with traditional fluorescent lighting were effectively resolved by replacing it with modern fluorescent lighting and daylight tubes. This solution was then effectively used within the new school. Nevertheless, alternative solutions which are marginally more expensive but provide even more beneficial lighting resolutions do exist. The fluorescent lighting mounts discussed so far provide direct lighting which utilises louvers to reduce glare. However, “a direct view of a strong light source, whether a fluorescent light, direct sunlight, or a very bright surface, creates glare and causes visual discomfort, fatigue, or even the inability to see” (Erwine, 2006, p. 27). According to Myler et al. (2003) “one solution is to use only indirect fluorescent lighting so that the lamps themselves are never visible to students.” These indirect fluorescent lighting systems can be either flush-mounted directly onto a standard ceiling or integrated within a modular ceiling. Pictures of such lighting can be seen below in Figure 11.14.

Flush-mounted system Integrated modular system

Figure 11.14: Indirect fluorescent lighting systems

This type of lighting has been highlighted as ideal for individuals with autism by Donna Williams, a high-functioning autistic lady who writes that "my ideal educational environment would be one where the room had very little … reflective light, where the lighting was soft and glowing with upward projecting [indirect] rather than downward projecting [direct] lighting" (Williams, 1996, p. 284). In addition to indirect lighting, another important way to soften lighting for students with autism is to ensure that the lights can be dimmed. The necessity for dimmable lights for students with autism due to their visual sensitivity was highlighted by the responses from interviewees during the course of this research who emphasised *lighting needing to be dimmable (3)*:

"The lighting is not satisfactory. The other room in there I couldn't turn the light on at all because I had a student who was sensitive to light … If I have one child in a classroom who is sensitive to light how can I moderate it for him? You know, you can't, can you? There's a fixed level of lighting that you've got when you put the light on." (T11)

This view is also supported by Farmer (n.d.), who suggests that "every light in your home should have a rheostat (dimmer) switch. Controlling the level of lighting throughout the house gives you the flexibility to respond to changing sensory needs." Furthermore, dimmable lighting also allows for maximal benefit of daylight within the classroom. "Daylight … varies throughout the day … dimmed electric lights can be added in stages as daylight fluctuates" (Erwine, 2006, p. 29). This can be easily achieved by installing day-light linked dimmers which automatically adjust the artificial

light level according to the amount of natural daylight within the room. This has the added benefit of minimising wasted energy and thus reducing electricity bills. Unfortunately due to the increased costs associated with dimmable light fixtures these were not installed within the new school.

In addition, staff also highlighted the importance of *light switches needing to be staff operable only (3)* due to students having obsessions with switches. For example they commented that:

"We have just normal light fittings like that and we've got one student that likes the lights on all the time, and one that likes them off, so they just keep clicking them … maybe the fish key lights would be better so they're adult operated with a key" (T5)

This issue can be resolved by utilising fishkeys, a method which was effectively implemented within new living accommodation for students with ASDs (Whitehurst, 2006b).

Another factor associated with artificial light which has been shown to impact upon individuals with autism is the colour of the light, for example respondents commented about *lighting needing to provide a natural and 'warm' colour rendering (2)*. As discussed in chapter 9, the decision was made to trial 'daylight' spectrum lighting within the research classroom and this was subsequently installed within the new school. This daylight spectrum lighting is beneficial since is provides a more natural colour spectrum.

In addition to this, recent research has investigated the impact of different lighting colours on individuals with autism, and found that some students are more relaxed and better able to engage in certain coloured lighting. Overall, "the main findings were that colour could affect behaviour and that in general reds were more arousing than blues and greens" with students presenting calmer and easier to engage under blue and green light conditions (Pauli, 2004).

The results from Pauli's research were reiterated by one interview respondent who discussed *providing coloured lights (1)* commenting that:

"With one of the particular boys I worked with, we found if we put green gels in the lights where he was in the classroom he was a lot calmer. I suppose it links a bit in with the colour impact project. And someone had done some work and found that he had been more responsive in those colours, so the areas in the classroom where he spent most of his time would have green lighting" (FI3).

Providing coloured lighting is therefore an important consideration for learning environments supporting individuals with autism, particularly where individual areas such as workstations can be specifically lit to meet the needs of an individual student.

MEMO (Artificial lighting, part 2)

The additional issues raised here reiterate the importance of making provisions to accommodate the visual dysfunction experienced by individuals with autism when developing an optimal learning environment for this population of students. Indirect light fixings, dimmers and coloured lighting can all reduce visual difficulties.
This problem also highlights the importance of considering common stereotypical behaviours, in this case obsessions with lights / light switches, through ensuring the lights are adult controlled.

11.2.9 Screens

As discussed in section 9.4.6, free-standing screens were a frequent component of the old school classrooms, since they were utilised to create the students' independent workstations. Within the new school this was not required, since the new workstations were created to have integrated screens. However, some students nevertheless required individual and screened-off choice areas to enable them to relax during free-time. Consequently it was necessary to develop a form of free-standing screen for this purpose.

In addition to the health and safety issues associated with free-standing screens identified during classroom observations, the interviews and questionnaires also identified other issues surrounding *screens needing to be sound absorbent (1)* and *screens needing to be robust (1)*. For example:
"They really throw these screens around you know" (T11).

This is further supported by earlier comments discussed surrounding workstation *screens needing to be more robust (5)* and *needing soft furnishings to absorb noise (1)*.

Based on this feedback, combined with the reflective nature of the PAR approach employed, it was possible to identify a number of important criteria to inform the design specification for the free-standing screens. These criteria were:

- neutral grey colour
- curvilinear shape
- robust material
- sound absorbing material

The old screens utilised in the old school and the free-standing screens designed for use within the new school can be seen below in Figure 11.15.

Figure 11.15: The old and new screens

As can be seen in Figure 11.15, the new screens (above right) were designed to be a neutral pale grey colour, to be curvilinear in shape, and to benefit from a combination of robust hard wood material and robust soft sound-absorbing carpet material to ensure that they were both sufficiently robust and also supported the acoustics within the classroom.

MEMO (Screens)

This problem again reiterates many of the previously identified considerations required to accommodate the visual, auditory and proprioceptive processing difficulties experienced by individuals with autism through providing a low arousal physical environment, as well as the importance of ensuring robustness.

11.2.10 Storage

Another issue which was frequently raised during the interviews and questionnaires was the importance of *making classrooms a distraction-free, low arousal environment (27)*, and thus classrooms *needing lots of storage (11)* to facilitate this. Due to the visual learning styles of the students and the high level of concrete resources needed,

this creates both an excessive amount of resources, and also resources which are big and thus which take up large amounts of space. In addition to this there is also a multitude of paperwork which needs to be recorded and kept on a daily basis regarding students' learning and behaviour. In the existing classrooms, resources and paperwork were frequently stored within the classroom, which resulted in a very busy, messy and chaotic visual environment, which was a frequent distraction to the students.
Comments from the interviews and questionnaires regarding storage revolved around two main issues:

1. *Needing lots of storage (11)*

"Adequate storage space is a necessity. Our students' work takes up more space than that of mainstream children who work in books. Our children often work with box-shaped tasks so storage is at a premium in most classrooms, and the paperwork for each child is extensive, so suitable storage is needed for this also" (R3)

2. Clutter distracting students / Storage needing to be out of sight (17)

"If it's there, or they know it's there and they can see it, it's a problem, but if you can lock things away in cupboards, and shut them away, even behind a curtain, for a lot of students who are lower ability that's enough for them to not know that it's there any more, and for others, they'll know it's there, but because they can't see it, it's helpful in preventing that distraction." (T5)

Examples of the eclectic classroom storage in the research classroom can be seen in Figure 11.16 below:

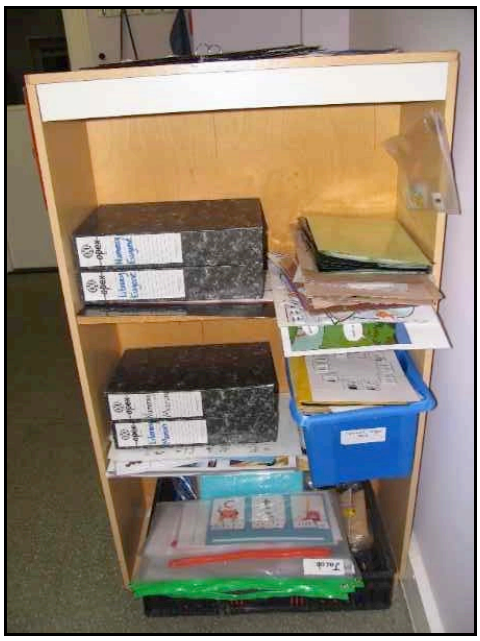


Figure 11.16: Eclectic, messy, highly visible and accessible storage in the research classroom

MEMO (Storage)

This problem again reiterates the importance of considering the visual dysfunction common in autism through reducing visual distractions in the environment, in this case through providing storage away from the main classroom.

The importance of providing a tidy and uncluttered environment in order to reduce visual distractions was considered in section 9.4.6 during the discussion surrounding the provision of suitable independent workstations. The specific issue of storage is also discussed by Plimley & Bowen (2006, pp. 9-10). They highlight that "good storage facilities for equipment, resources and personal possessions [are important] … storage space can get over-looked. You may need to lock away some tempting items (e.g. computer) or at least have enough storage to be able to be self-sufficient."

In order to address the storage issue within the new school, all classrooms were provided with an adjoining walk-in storage room of sufficient size to store the students' resources and related paperwork. Examples of the storage rooms in the new school can be seen in Figure 11.17.

Figure 11.17: self-contained storage rooms within the new school

11.2.11 Computer Storage

In addition to the issue of suitable storage for student resources and paperwork, another issue which was identified through classroom observations, interviews and questionnaires was the need for suitable storage for the classroom computer. Observations within the research classroom revealed that many of the students were highly motivated by the computer, and time on the computer was frequently used as a reward, with some students being obsessive about using the computer. The interviews and questionnaires further highlighted the importance of *needing a computer in the classroom (6)* and emphasised the issue of *students obsessing about computers (2)* and consequently the *computer needing to be screened off / protected (3)* to prevent them being a distraction or getting damaged. For example one respondent suggested:

"…somewhere where there's a computer that's locked away, so that the students who are obsessive about computers aren't distracted by them. We had ours in a separate room in blackberry cottage and that worked really well because when it was locked it was out of bounds, you couldn't even ask about the computer because you couldn't see it to ask for it." (FI2)

The computers therefore need to be stored safely to ensure that they are not damaged and not a distraction. In order to provide a solution which would enable the computers to be in the classrooms but also stored safely and out of sight, the furniture design team who created the bespoke tables, workstations and screens were asked to produce a computer storage desk which would allow the computers to be lowered within the desk when not in use, and raised above the desk for use. In addition, due to the reflective nature of the PAR approach employed, it was possible to identify a

number of important criteria to inform the design specification for the computer storage desks. These criteria were

- neutral grey colour
- curvilinear design
- robust materials
- screened sides to limit distractions

MEMO (Computer Storage)

This problem again reiterates important issues raised through other identified problems:
1. It is important to consider common stereotypical behaviours and obsessions, in this case computers, and provide adult control if necessary.
2. It is important to consider the consequences of challenging behaviour and thus the need to protect expensive equipment.
3. It is important to consider student independence through ensuring equipment is accessible within the classroom.
4. It is important to consider sensory difficulties and provide a low-arousal, distraction-free environment.

Pictures of the computer storage desks installed within the new school can be seen in Figure 11.18.

Figure 11.18: Computer desk in the new school

11.2.12 Kitchen Areas

Classroom observations within the research classroom revealed that having a kitchen adjoining the classroom was extremely beneficial for:

- enabling the students to be taught daily living skills such as washing up their dishes after snack time
- providing the students with a sink to wash their hands
- ensuring a suitable area to store food for snack time
- providing access to a tap with drinking water

These benefits were further supported by the interviews and questionnaires which revealed the difficulties encountered by classrooms which did not have a kitchen area adjoining or within the classroom. For example, respondents highlighted *classrooms needing access to water / sinks (2)* and *needing kitchen facilities to teach life skills (3)*. For example:

"I think a sink in every room. That's the only thing we haven't got. They took the sink out, and I think that throws the students completely, which shocked me, but it has thrown me as well. You don't realise how often you go to wash your hands, or get the squash. We've trained the students at snack time to put it in the sink when they're done, and now they can't. So perhaps a sink" (T9)

Nevertheless, as with the water issues surrounding toilet areas, the issue of *water needing to be under control of staff (3)* also requires consideration. This issue is reiterated by Plimey & Bowen (2006, p. 10) who highlight that "having running water and a sink may be useful, although children with ASD can be attracted to taps and sinks. However, having a water supply increases the number of activities you can offer; not just subject-oriented, but also making drinks independently or teaching kitchen skills."

MEMO (Kitchen Facilities)

This issue again reiterates the importance of considering:
1. Student independence through providing access to environments to learn self-help and daily living skills within the classroom e.g. toilets & kitchens
2. Common stereotypical behaviours and obsessions – in this case water, and the need to have adult control.

To address these issues within the new school, all the classrooms were designed to have either a kitchenette area within the classroom, or a small adjoining kitchen. In order to ensure that the students could not access the kitchen unsupervised if this was not suitable, the kitchenettes were designed to have pull-down lockable shutters for when the area was not in use. Pictures of the kitchen and kitchenette areas in the new school can be seen in Figure 11.19.

Figure 11.19: Kitchenette and kitchen areas within the new school, shown both with protective shutter up and down.

In addition to these in-class kitchen areas, the new school also benefits from a purpose-built home economics room where students can partake in cooking activities, as well as practicing skills for independent living such as washing up and using a washing machine, dishwasher and microwave. This room was designed to benefit from the same neutral colouring and curvilinear design principles utilised in the classrooms. Pictures of the specially designed home economics room in the new school can be seen in Figure 11.20 below.

Figure 11.20: The home economics room in the new school, where students can learn cooking skills and other independent living skills.

11.2.13 Other Sensory Integration Equipment

As discussed in sections 3.2.3 and 3.2.4, many students with autism have sensory processing and regulatory difficulties. One consequence of this is that they benefit from opportunities for vestibular stimulating activities. Consequently, it is important to provide lots of opportunities for movement and exercise, particularly activities which provide vestibular stimulation such as trampolining, swinging and rocking. In addition to interview and questionnaire respondents highlighting *students enjoying rocking and it being important for calming (4)* as discussed in section 9.4.8, they also discussed the importance of *providing sensory equipment for self-regulation (8)* and *having rooms for sensory activities (8)*. For example, one teacher commented that:

"I'd like to see far more sensory activity or sensory rooms available" (T13).

To this end, in addition to classes being provided with the rocking chairs discussed in section 9.4.8, many of the new classes also have trampettes, and a range of other equipment available within the classroom to assist students in self-regulating and calming. These include tents to provide safe enclosed spaces, and weighted blankets to provide heavy tactile pressure. Both of these, as discussed in section 9.4.5, have been highlighted by Temple Grandin to have a calming effect for individuals with autism. Photographs of these items can be seen in Figure 11.21 below.

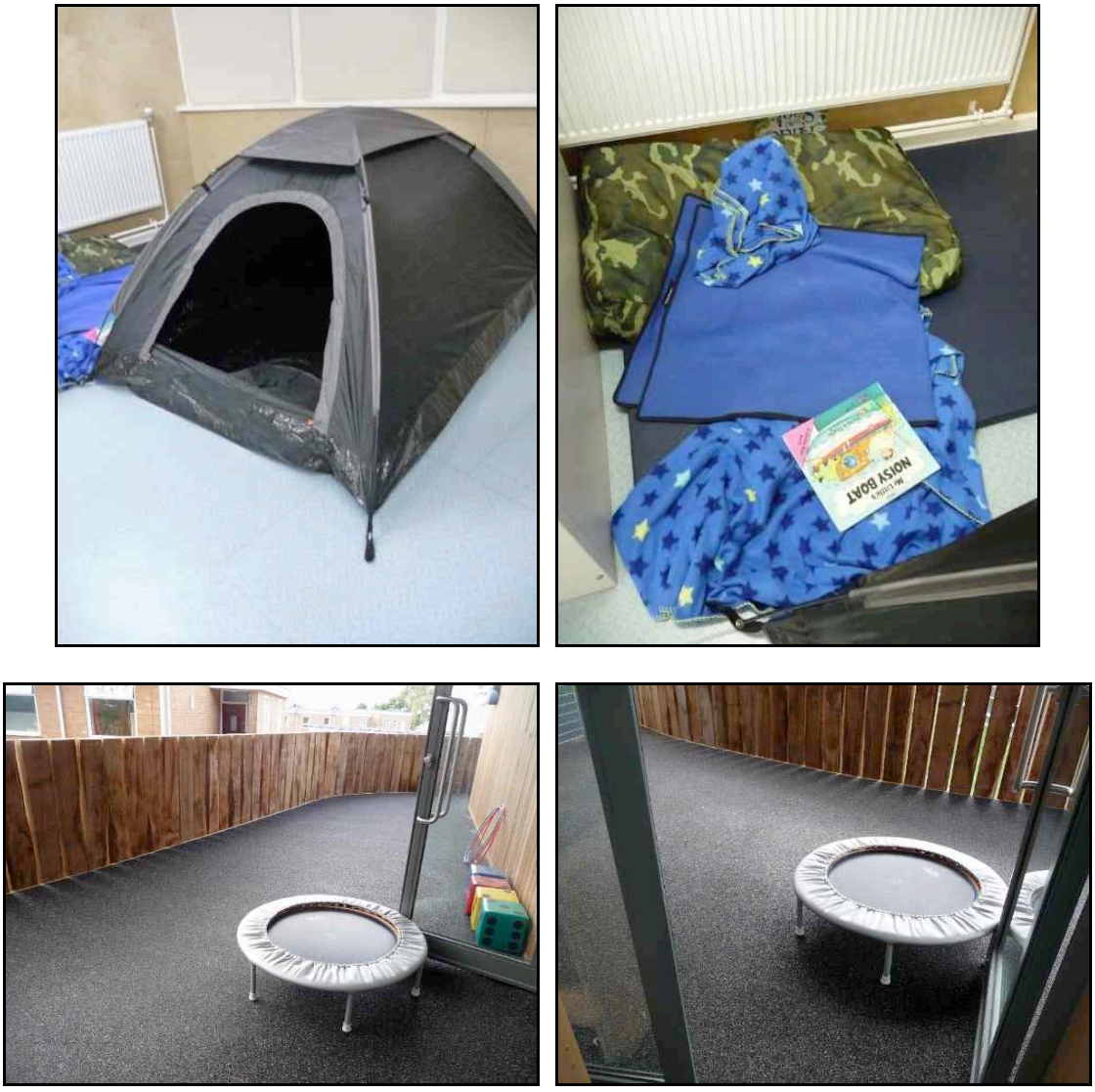


Figure 11.21: Trampettes, tent and weighted blankets in the new school

An idea which has not yet been tried within the new school is that of an indoor swing. Similarly to *students enjoying rocking and it being important for calming (4),* many students with autism also enjoy the sensory stimulation gained from swinging, and find this very calming - *students enjoying swinging and it being important for calming (3)*. However, since swings are generally outdoors, this can cause problems due to *access to outdoor areas being weather-dependent / requiring staff (4)*. For example, interviewees commented that:

"We kept having incidences with him because he wanted to be outside on the swings and we couldn't let him" (T11).

In response to this issue, one respondent highlighted *needing an indoor swing (1):*

"I think most classrooms could do with a swing inside … the swing is a really useful calming mechanism, but if you haven't got it because it's raining you can't use it, and a lot of our kids, 5 minutes on the swing will take them out of crisis" (FI2).

Installing an indoor swing is also an idea promoted by Farmer (n.d.), who suggests that one should "engage a carpenter to reinforce the joists in your ceiling to accommodate an interior swing. A durable clip and eyehook system allows for quick changes to different types of swings for various sensations." IKEA sell a swing which is described as "suitable for both indoor and outdoor use. Swinging develops the sense of balance and body perception. It also brings a feeling of well-being and relaxation" (IKEA, n.d.). It is designed to take weights of up to 100kg / 220lb / 15 ½ stone, and thus would be suitable for the vast majority of students at the school. Unfortunately it was not possible to trial this within the research classroom as the ceilings were not high enough. A picture of this swing can be seen below in Figure 11.22.

Figure 11.22: The IKEA indoor swing

Nevertheless, the new school also benefits from a sensory integration room where students can use a range of other equipment under the supervision of occupational therapists to stimulate and calm their sensory systems. These include a wide range of equipment including rockers, scooters, physiotherapy balls and tactile toys, photographs of which can be seen below in Figure 11.23.

Figure 11.23: Sensory integration equipment in the new school.

MEMO (Other Sensory Integration Equipment)

This problem reiterates the importance of considering the sensory regulatory difficulties experienced by individuals with autism through providing a range of sensory integration equipment to assist students in self-regulating their sensory systems and consequently maintaining a calm emotional state necessary for effective engagement and learning.
In addition this problem also highlights the importance of promoting student independence through providing equipment which students can access independently in order to self-regulate.

11.2.14 Equipment and Opportunities for Physical Exercise

As discussed in section 9.4.9, it is important for students with autism to have opportunities for physical exercise throughout the school day. In addition to daily exercise routines and the provision of exercise bikes and trampettes within the classroom, another effective solution for this is for students to have a safe outdoor play area adjoining the classroom. This is an idea promoted by the NAS who suggest that "gardens can be useful outlets for people with autism: some find running around in the garden an effective way of relieving stress in a safe environment" (Nguyen, 2006, p. 15).

The provision of safe outdoor play areas was a resolution utilised for the autism-friendly living accommodation described by Whitehurst (2006a, p. 6):

> *"The adjoining houses are built around a central, shared courtyard. This provides a safe outdoor environment for the children and is located centrally so that children can play independently while still being observed by staff. The covered areas consist of hanging canopies … This feature provides a dry open area for the storage of play equipment as well as shelter for outdoor play even during inclement weather … Staff have reported enormous benefits of this shared outdoor space. 'Three kids were playing out in the sandpit……they play alongside each other in a way which we wouldn't have seen happen before' … for many of the children, having safe accessible outdoor play has increased their levels of autonomy and decreased their frustration – they can choose to go outside when they want and no longer have to just look through windows to outdoor spaces which they cannot access."*

Many of the interview and questionnaire respondents also identified the importance of *having easily accessible outdoor areas for outdoor exercise (10)* where students can play safely and independently without the difficulty of *access to outdoor areas being weather-dependent / requiring staff (4)*. For example:

"We're really lucky here to have the outdoor area, and we get to go and have a run round outside and then after that they're able to focus more I think." (T5).

MEMO (Equipment and opportunities for physical exercise, part 2)

This problem again indicates the importance of providing students with autism opportunities for physical exercise in order to enhance engagement and learning.
This problem also emphasises the importance of promoting independence through providing exercise areas which students can access independently.

In order to address these issues, the new school was designed so that all classrooms had a safe adjoining outdoor play area for students to access throughout the school day. These areas are suitable for students to play independently whilst being observed from indoors by staff. In addition an overhanging canopy provides protection from rain. Pictures of these outdoor play areas can be seen in Figure 11.24.

Figure 11.24: The outdoor play areas in the new school

In addition to this, the new school also benefits from a purpose-built and fully equipped sports room for indoor exercise (see Figure 11.25 below).

Figure 11.25: Sports room in the new school

11.2.15 'Circulation Space' Corridors

Another problem identified through the interviews and questionnaires was that of the *narrow corridors being a health and safety risk (2)*. Due to a) students being in too close proximity to each other:

I want "narrow corridors to be minimised – narrow corridors can force children to be confronted by others which can cause a crisis" (R25)

and b) health and safety issues arising from challenging behaviour:

"the very worst thing about this classroom is that we've got a very small, very tight narrow corridor that runs from one end to the other, and that's a big problem here, because you can either get very hurt by being stuck in that space, or if you need to restrain a child, you can't do that in that space" (T5)

MEMO (Circulation Space Corridors)

This problem reinforces a) the importance of considering the sensory dysfunction common in autism in order to provide an optimal learning environment – in this case the impact of tactile and proprioceptive dysfunction and the need for wide corridors to avoid close proximity with others; b) the importance of considering challenging behaviour and thus the need for wide corridors to reduce health and safety risks through providing staff with adequate space to handle the situation effectively should a student become distressed.

Due to the sensory sensitivities characteristic of autism, as described in the statement above, unexpected close proximity with others can cause individuals with autism to become distressed. An effective resolution utilised within the autism-friendly living

accommodation described by Whitehurst (2006) was to design corridors as ‘circulation spaces’ wide enough for groups to move comfortably along the pathway, as well as for children to utilise the space as a relaxation area if they wished to. Based on the success of the ‘circulation spaces’ utilised within this accommodation, a similar principle was applied to the new school building, and corridors were designed to be wide ‘circulation spaces’ with seating available for students to sit and relax if they wished to. Pictures of the ‘circulation spaces’ throughout the new school can be seen in Figure 11.26.

Figure 11.26: The ‘circulation spaces’ in the new school

11.2.16 Walls

As discussed in section 9.4.5, curvilinear design has been found to be beneficial to facilitate the movement of individuals with proprioceptive dysfunction and visual-spatial processing difficulties, and create a calming environment. Based on this knowledge, in addition to the ‘circulation spaces’ being designed to be spacious and welcoming

environments, the school was also designed to have curvilinear walls throughout, to facilitate the students' movement through the school. Furthermore, neutral solid colours were utilised throughout, and wall decorations were kept to a minimum, to provide a low arousal environment. Pictures of the curvilinear walls utilised in the design of the new school can be seen in Figure 11.27.

Figure 11.27: Curvilinear walls in the new school

11.2.17 Security & Safety

Observations in the research classroom revealed that because many of the students had no awareness of danger and were likely to abscond, it was necessary to keep all external classroom doors locked in order to ensure the students' safety. This was observed to be the case with the majority of classrooms throughout the school, and questionnaire and interview respondents highlighted the importance of *making the environment safe (6)*. For example, *"doors that can't be slammed but can be closed very quickly" (R3).* This is also an issue acknowledged by the NAS. They emphasise that "some people with autism have little or no awareness of danger … some people with autism may run out of their house, school or service" (Nguyen, 2006, p. 8 & 10).

MEMO (Security & Safety)
This problem re-emphasises the importance of considering the sensory dysfunction and resulting lack of sense of danger common in autism in order to ensure that the environment is suitably safe and secure and thus 'fit for purpose'.

Within the new school, this issue has been addressed by installing a central automated door locking mechanism on all external doors. Consequently, all the external doors

require a fob to be unlocked, which only staff carry. In this way it is possible for classroom doors to remain unlocked and at the same time ensure the safety of the students, since it is impossible for students to exit the building without supervision.

11.2.18 Acoustics

Section 10.3.5 highlighted the issue of *noise affecting students (30)* and the impact that poor acoustics can have on students with autism due to their sensory processing difficulties. This view is also supported by Harker & King (2002, p. 162), who state that "noise is a special concern because heightened sensitivity goes with autism and what is tolerable for most of us may be very difficult for some." "The primary factors which affect classroom acoustics are reverberation, background noise levels, and signal-to-noise ratio" (Maxwell, 2006a, p. 35). As discussed in section 10.3.5, Flotex flooring was identified to improve the acoustics in the classroom through reducing background noise. "Carpeting alone, however, does not provide enough sound absorption to solve classroom noise problems … appropriately designed walls, floors, ceilings and roofs can significantly reduce noise transmission to adjacent spaces" (Maxwell, 2006a, p. 42).

In order to support the acoustic benefits provided by the Flotex carpet, and address the issue of classroom acoustics as best as possible, it was therefore necessary for the architects to employ a variety of methods to improve the acoustics of the new school building. This included considerations such as ensuring the ceilings were of an optimal height, since "ceiling height is an important part of managing classroom noise" (Maxwell, 2006b, p. 43). This was highlighted by interviewees and questionnaire respondents who noted *Classrooms being echoey (caused by high ceilings) (4),* for example:

"the ceiling is too high, it causes echoes" (T11).

In addition, the building design also incorporated appropriate insulation and slatted ceilings, amongst other methods. For full information regarding the strategies utilised to provide optimal acoustics within the classrooms please contact Glazzards architectural firm, the architects for the new school build.

11.3 The Staff

Although exploring the impact of the physical environment was the primary focus of this research, the literature also highlighted that when developing a learning environment to support students with profound autism to engage as effective learners, two other key elements of the learning environment require consideration:

1. the people in the environment (staff and peers), and
2. the teaching approach and resources

Many interview and questionnaire respondents highlighted the *importance of staff (9),* with one respondent commenting that:

"The most important element [of the learning environment] is the staff and their approach" (R2).

Section 10.3.8 touched on issues relating to staff having a responsive interactive teaching style. This section shall now outline three other staff-related issues raised by interview and questionnaire respondents which were highlighted as having an influence on students' engagement in learning:

- ***Number and consistency of staff (14)***

"There's a high staffing ratio to keep them on track … you couldn't do anything without the right amount of people." (T4)

- ***Staff knowledge of autism / individual students / teaching approaches (17)***

"Who's doing the teaching, who's facilitating the learning is a very important thing. Knowing the needs of the children, knowing exactly what it is that they're going to need you to do to help them to learn, and that might be things that you need to do physically to adapt things, or it might be you might need to adapt the contents slightly, even as you're working with the child, I think that's got a massive massive impact. If we have supply staff in, you notice the difference, absolutely." (T5)

- ***Staff attitudes and approach (24)***

"I've got a fantastic team that are all always really open to the students … we always try to respond to the kids as much as we can, and the group, the staff team that I've got are very open and very patient" (T6)

It is therefore clear that the number, attitude, approach and knowledge base of staff working with students with autism are all crucially important factors which influence the engagement and learning of this group of students. Since it was not possible to explore

these issues in detail through the present research, this is a key area for future research.

11.4 The Students

A number of student-related factors were also raised as factors which influence student engagement. As discussed in section 10.3.4, a number of interview and questionnaire respondents highlighted the benefits of having more than one base classroom to separate larger class groups or students who struggle to work alongside each other. These issues were reiterated by comments regarding the impact that the *number of students (13)* and the *peer groupings (17)* can have on student engagement. For example:

- **Number of students**

"The amount of students or people in the class" influences student engagement (T13)

- **Grouping of students**

"Grouping of students in the class" influences engagement "not all students work well together – similar needs should be grouped together" (R20)

According to Maxwell (2006a, p. 17), "the greatest improvements in academic performance occur when classes … reduce class size." Furthermore, in classrooms for which it is not possible to further reduce class size, research has highlighted that "stimulus overload can also contribute to the perception of crowding. In general, recommended strategies involve the following:

- creating personal space
- subdividing the classroom into smaller work areas
- providing adequate learning resources
- avoiding clutter both in the room and on the walls
- reducing noise levels
- providing opportunities for restoration [alone-time]" (Maxwell, 2006b, p. 17)

Since, as discussed in sections 3.2.3 and 3.2.4, and highlighted throughout this thesis, stimulus overload is a significant problem for students with autism, all of the issues outlined above have been addressed through the course of this research. Hopefully therefore the environment promoted should reduce the perception of crowding.

In addition, a variety of other 'internal' student factors were highlighted to impact upon engagement and learning for students with autism. These included: short attention spans, sensory issues, physical comfort, behaviour, auditory processing, anxiety, illness, tiredness, mood, issues with family/friends/carers, their autism / learning difficulty, communication difficulties and many others. For example, respondents commented that:

"Some of our students tend to have very short attention spans … they will be distracted and just be on task for a minute, seconds even some times" (T4).

It is important to be aware of such factors when attempting to engage students with autism in learning. Since this research did not have the opportunity to explore these issues in any depth, future research investigating these areas would be of benefit.

11.5 The Teaching Approach and Resources

A large number of different teaching approaches and strategies were discussed by the interview and questionnaire respondents as being beneficial for students with autism. As discussed in sections 10.3.7 and 10.3.8, two of these (II and IWBs) were investigated through this research. The multiplicity of approaches identified was too extensive to enable an exhaustive list to be provided here, however the responses highlighted five key themes which are important to consider when teaching students with autism. These are:

- ***Appropriateness of teaching approach and resources (24)***

"I think the developmentally appropriate approach is the best way to go in order to get their engagement … I think if people are trying to get students to do things that developmentally it's just not gonna happen for them, then they're not gonna be engaged … I think people tend to forget the developmental age and how important that is for the activities that you plan for them." (T6)

- ***Using a variety of approaches (26)***

"I'm open to as wide a variety [of teaching approaches] as I can. I do try and look for any approaches or strategies that I see around that I think will help the students … so it's trying to incorporate as much as possible with all the students really to try and get them to engage with as much as possible through a variety of different means." (T1)

- ***Personalising teaching (19)***

"If it's not differentiated enough for the individual student, that can prevent them from engaging, so you need to vary your teaching styles depending on the kids that you're talking to, and that can be four kids around a table, and varying the teaching style for each one." (T14)

- ***Making learning meaningful and motivating (22)***

"The class activities, if they're not relevant and interesting, and at a suitable level, they're not gonna engage." (T5)

- ***Recognising and targeting students' learning styles and preferences (22)***

"If you're not providing them with activities that address their way of learning, some people are very visual learners, some students are more auditory with their learning, and it's making sure that you provide a wide range of teaching methods, that enable all the students to be able to learn, with a particular content that you're trying to deliver." (T8)

- ***Benefits of the TEACCH approach (18)***

"TEACCH helps them to focus and helps them to understand. If they're not understanding then they can't learn at all … it has given X that much more independence, and he's that much more relaxed, his anxiety levels have gone right down, because he understands what's going on." (T2)

Since it was not possible to explore these areas in any detail through the course of this research, investigation of the issues raised through this research with respect to the students, staff and teaching approach would certainly be an important focus for future research surrounding optimal learning environments for students with autism.

11.6 Theoretical Model Development

Based on the findings of this research, it is possible to postulate emerging theoretical models to inform the design of learning environments which support students with profound autism to engage as effective learners.

11.6.1 Theory: Developing a Supportive Learning Environment

Firstly, as indicated by the literature review and confirmed through the theoretical coding undertaken during this grounded PAR study, there are 3 key elements of the learning environment which require consideration in order to accommodate the social and sensory-perceptual difficulties and unique learning styles characteristic of autism:

1. The physical environment
2. The teaching approach and resources
3. The social environment (staff and peers)

These three elements interact as theorised in Figure 11.28 to support the engagement in learning of students with autism.

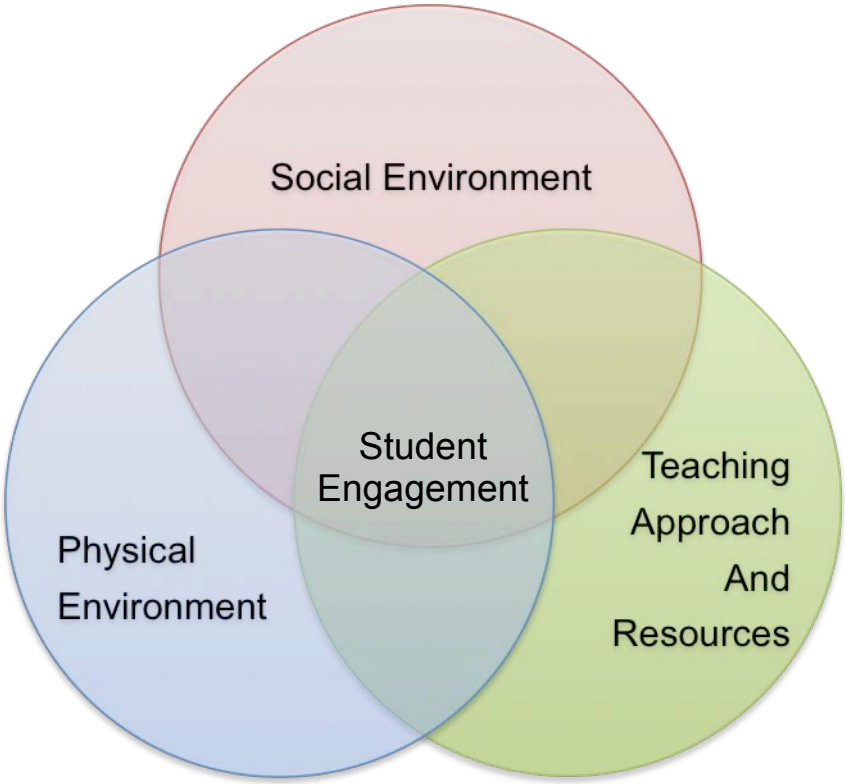


Figure 11.28: Theoretical overview of factors influencing engagement in learning for students with profound autism

Furthermore, the findings of this research suggest that these three aspects can be adapted to effectively enhance the engagement and learning of students with autism. This research particularly focused on the physical environment, and a process of theorising to determine the common roots of the identified problems addressed through this research was undertaken. Appendix 11 shows the key issues extracted through this process from each of the identified problems in order to postulate theory. From this process, this research suggests that from closer inspection, an emerging theoretical model (presented in Figure 11.29 and Table 11.3) can be formulated which proposes that there are 12 key issues which require consideration in order to develop an optimal physical learning environment for students with autism:

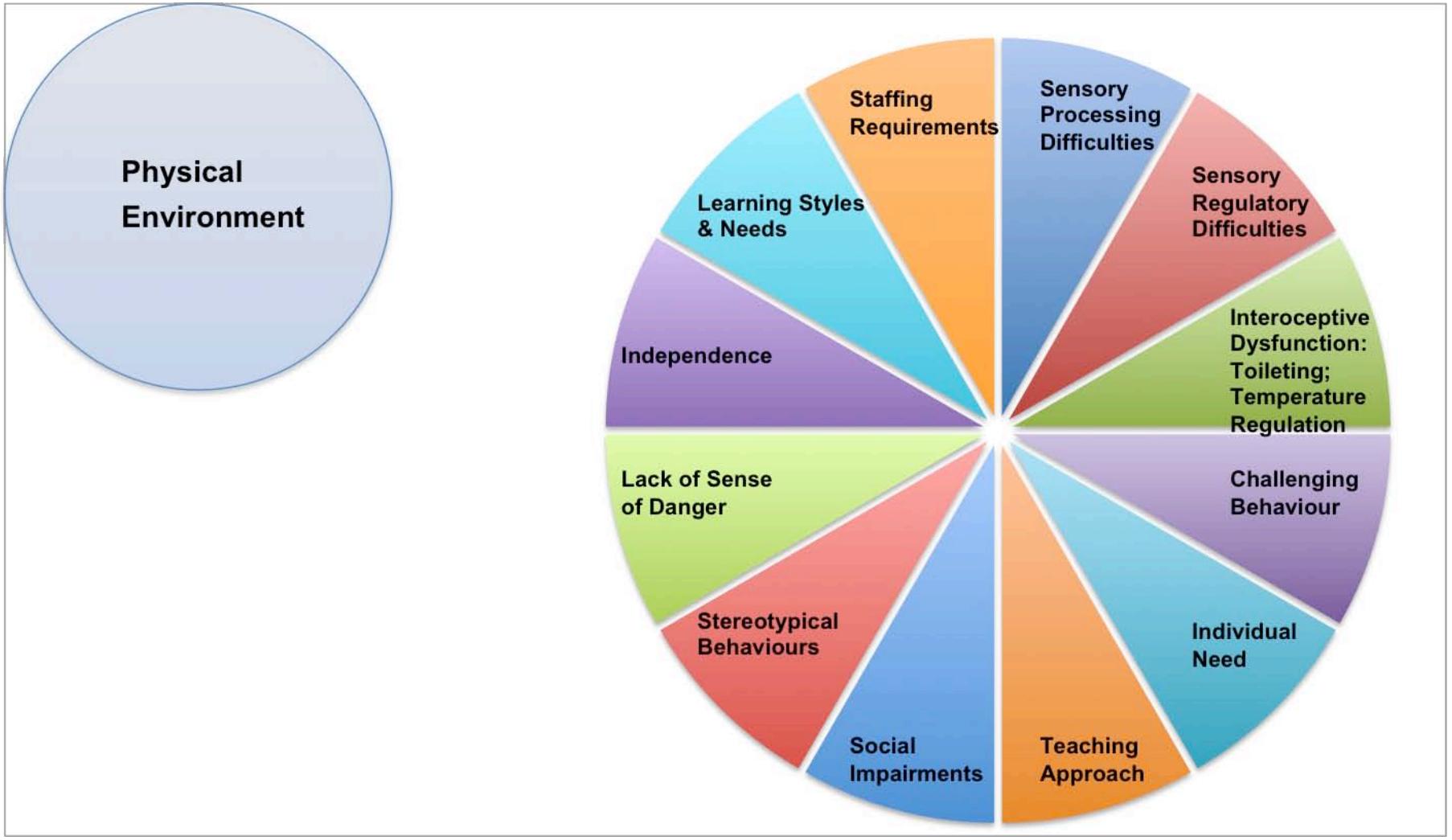


Figure 11.29: Theoretical overview of factors influencing the development of a supportive physical environment for students with profound autism

>>> Sensory Processing Difficulties
Accommodate exteroceptive **sensory processing difficulties** through providing a **low-arousal physical environment** characterised by solid neutral colours, non-reflective surfaces, sound insulation, curvilinear design, distraction-free, uncluttered, anti-tilt chairs, separate rooms for noise / quiet, separate storage spaces, suitable artificial and natural lighting and blinds.
>>> Sensory Regulatory Difficulties
Accommodate **sensory regulatory difficulties** through providing suitable areas / opportunities / activities for **physical exercise and sensory regulatory activities** such as rocking / swinging.
>>> Interoceptive Dysfunction
Accommodate **interoceptive dysfunction** through providing **suitable toileting facilities**, ensuring **cleanability** to maintain hygiene, and providing suitable **environmental temperature control** mechanisms.
>>> Challenging Behaviour / Harsh Use
Consider the impact of **challenging behaviour / harsh use** on furniture through ensuring **robustness** and durability so that the environment is **'fit for purpose'** and expensive **equipment can be safely stored** away. Also consider health & safety issues resulting from challenging behaviour through ensuring **adequately sized classrooms, wide corridors, sturdy furniture and chill-out rooms**.
>>> Individual Needs
Address the **individual needs** of students with autism through ensuring **flexibility** e.g. through flexible furniture design.
>>> Teaching Approach
Consider the **teaching approaches and activities** being used and provide e.g. **adequate space** for TEACCH structure, **suitable furniture** to accommodate TEACCH worksystems, **comfortable flooring** for Intensive Interaction / Sherborne, **moppable flooring** for sensory play.
>>> Social Impairments
Accommodate the **social impairments** characteristic of autism through providing both **group socialisation areas** and spaces for students to **retreat alone**, and providing suitable spaces for interactive & **responsive** teaching.
>>> Stereotypical Behaviours
Accommodate common **stereotypical behaviours** such as obsessions with **water, lighting and open windows** through ensuring these are under **staff control**.
>>> Lack of Sense of Danger
Accommodate the **lack of sense of danger** common in autism through ensuring that the environment is suitably **safe and secure**.
>>> Independence
Facilitate student **independence** through ensuring **access** to toilet facilities, kitchen facilities, outdoor areas and sensory integration equipment as appropriate to learn independent self-help, self-regulation and living **skills**.
>>> Learning Styles & Needs
Consider **learning styles and needs** through **visual supports**, **physical structure**, **interactive whiteboards**, and providing **distinct areas** for different activities.
>>> Staffing Requirements
Consider **staffing requirements** through ensuring adequate **space for staff at the group table**, and ensuring staff can observe students at all times through **observation windows**.

Table 11.3: Factors influencing the development of a supportive physical environment for students with profound autism

11.6.2 Theory: Developing a tool to measure student engagement

In addition to exploring the development of a supportive learning environment for students with autism, this research also explored the concept of engagement and the development of tools sensitive to the learning profiles of students with profound autism in order to measure engagement in learning for this population of students. From the grounded analysis undertaken, as outlined in section 7.6, it is clear that educators, therapists, care staff and a range of other professionals all consider engagement to be crucial for effective learning. However, in addition to this, when asked to describe indicators of engagement, many respondents commented that *engagement looks different for each student* (10). For example:

"I think that depends from student to student doesn't it. For some it might be their gaze, whether they're looking appropriately at what you want them to look at … For others it might be … their body language, how they're sitting … It varies. I've got one student who will just, he'll run around the room, and I know he's looking at the thing I'm asking him to do, it's just that he needs to get up and run over there and come back before he can really focus on what he's doing" (T5)

"I think that's down to the individual child. I think you get to know whether they're focused, whether they're engaged in their work, or whether they're opting out. I think you need to know the individual to be able to pick that up … If you know certain individuals you know whether they can work harder or become more engaged than they are" (T9)

"Like ASD, indictors of engagement are different in each case, especially in our population" (R19)

Based on these findings, this research theorises that whilst the tools developed and used through this research provided suitable researcher tools, to be most effective as an educator tool to enhance student learning, a measure of student engagement should enable a process of 'personalising engagement'. This process would allow engagement to be defined for an individual student such that a personalised profile of how the student demonstrates engagement can be created. It is anticipated that this will provide greater sensitivity to and awareness of the unique engaged / disengaged behaviours of the individual student, thereby facilitating identification of how to enhance engagement for the individual student and thus how to support them to fulfil their learning potential.

11.7 Conclusion

In conclusion it can therefore be seen that there are many factors relating to the physical environment, teaching approach and resources, and people in the

environment which need to be addressed when developing an autism-specific learning environment. An overview of the modifications to the learning environment trialled through phases 1 and 2 of this research can be found in Table 11.1. The issues identified and discussed through this chapter are shown in overview in Table 11.4. In particular, this research has evidenced an array of features of the physical environment which require consideration when developing a learning environment which supports students with profound autism to engage as effective learners, and has postulated a theoretical model to inform the design of educational buildings for this population of students. In addition, this research has also explored the concept of engagement and proposed a theoretical model to inform the development of educator tools to profile student engagement.

No	Issue
Physical Environment	
1	Toilet / washing facilities
2	Classroom Size
3	Windows and related issues including room temperature, sun light, ventilation, distraction
4	Artificial lighting
5	Natural lighting
6	Screens
7	Storage
8	Computer storage
9	Kitchen areas
10	Sensory integration equipment
11	Equipment and opportunities for physical exercise
12	'Circulation space' corridors
13	Curvilinear walls
14	Security
Staff-Related Factors	
1	The number of staff in the class
2	Staff's knowledge of autism and individual students
3	Staff's attitudes and approaches
Student-Related Factors	
1	The number of students in the class
2	Student groupings
3	Internal student factors
Teaching Approach and Resources	
1	the appropriateness of the approach / resources
2	using a variety of approaches to meet student needs
3	personalising teaching to meet individual student needs
4	making learning meaningful and motivating
5	targeting students' learning styles and preferences
6	the benefits of employing the TEACCH approach

Table 11.4: List of issues discussed in chapter 11

CHAPTER 12

CONCLUDING DISCUSSION

12.0 Overview

This chapter provides a discussion of how this study achieved its aims and objectives and answered the research questions, highlighting key contributions to the body of knowledge, discussing any limitations that may have affected the findings, and reviewing the theoretical models postulated. The chapter then examines some general arguments surrounding the merits and drawbacks of providing 'autism-friendly' environments. Finally it proceeds to provide an overview of the main findings of the research and recommendations for future research and the education of students with autism before concluding the thesis.

12.1 Research Aims, Objectives & Questions

The principle aim of this research was to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners. To reiterate, the specific objectives of the research were to:

1. Build an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs
2. Devise engagement scales sensitive to the learning profiles of students with ASDs
3. Evaluate the influence of trialled modifications on student engagement through engagement scale data triangulated with other data

The research questions addressed were:

1. What features of the classroom learning environment, (with a focus on the physical environment of the classroom), influence engagement in students with ASDs?
2. What does an engagement scale sensitive to the learning profiles of students with ASDs look like?
3. What influence do trialled modifications have on student engagement?

12.2 Fulfilling the Aims, Objectives & Questions

This research was largely successful in fulfilling its aims and objectives and answering the research questions. A summary of how this was achieved within the present study shall now be presented.

12.2.1 Employ Evidence-Based Research to Develop a Learning Environment which Supports Students with Profound Autism to Engage as Effective Learners

As reported in the methodology chapters, this study adopted the framework of the Mosaic approach (Clark & Moss, 2001) to enable the students' views to inform the design of their new school. As such, students and practitioners acted as co-researchers in order to co-construct an evidence-base of features of the classroom learning environment which influence engagement in students with autism. A PAR spiral incorporating student observations, engagement scale data and direct student voice, was combined with a grounded theory study involving interviews and questionnaires with significant adults, and enhanced through fostering reflexivity. The methodological framework, strategies and approaches selected contributed greatly to the overall richness and trustworthiness of the findings through ensuring that the evidence-base developed is grounded in the daily lived experiences of these students, provides a true reflection of the students' views, and was corroborated through extensive triangulation.

Through employing a PAR spiral, this research successfully utilised naturalistic observation to enable the behaviour of 6 students with profound autism to 'speak' where their words could not. Furthermore, by utilising specially adapted methods of obtaining direct student voice, this research allowed the students to participate where otherwise they would not have been able to. In these ways, this ground-breaking research successfully supported students with profound autism to express their views in order to develop an evidence-base to inform the design of their new school. As such, this study provides a useful example of 'inclusive research' (Walmsley, 2004) or 'collaborative research' (Knox, Mok & Parmenter, 2000) in which individuals with learning disabilities are 'co-researchers' (Ward & Simons, 1998) or 'co-constructors' of knowledge (James & Prout, 1997; McDonagh, 2003).

Through undertaking a concurrent grounded theory study, this research successfully obtained the views of the wider population of students at the research school and

corroborated and enhanced the progression and the findings of the PAR spiral. The grounded study also enabled the development of theoretical models to inform both the design of learning environments for students with profound autism and the application of engagement to enhance student learning. In this way this research provides a valuable illustration of how grounded theory and action research can be combined to produce "theory-rigorous and powerfully improved action research" (Baskerville & Pries-Heje, 1999) in order to inform evidence-based practice in education.

In addition, this research also fostered reflexivity through ongoing collaboration and a reflexive journal, in order to expose the researcher's perspective and understand the influence of the researcher as a "human research instrument" (Cohen & Crabtree, 2006). As revealed through the reflexive journal excerpts, the collaborative aspect of this research was hugely beneficial for cultivating dialogue between the co-researchers, as well as with other professionals. In this way it was possible for biases and different opinions and perspectives to be recognised and debated in order to identify the most effective direction for the research to progress in. The reflexive journal was also beneficial to enhance the lead researcher's awareness of their own innate biases and opinions. This deeper appreciation was hugely valuable in supporting the researcher to observe and analyse situations, interventions and data with an 'open mind'. Through providing the reflexive journal excerpts throughout this thesis it is hoped that the reflexivity fostered through this research will be transparent to the reader. In summary, it is anticipated that fostering reflexivity throughout this research has enabled the findings to truly reflect the views of the students, since "reflexivity … takes as its basis the view of the construction of knowledge in which data are authentic and reflect the experiences of all participants" (Cohen et al., 2007, p. 310).

Whilst the benefits of implementing evidence-based practice in education informed by quality research is undisputed, in recent years there has nevertheless been considerable debate surrounding the topic of what constitutes evidence-based research in education (Olson, 2004; Slavin, 2002; Slavin, 2008). To date, there have been two contrasting definitions of evidence-based research advocated. The first defines evidence-based research as necessitating scientific experimental design. The second, in contrast, identifies evidence-based research as qualitative, correlational and descriptive research (Fitzallen & Brown, 2007). However, this is not a debate which

shall be entered into in the current thesis. Rather, since this research was undertaken within a qualitative framework, the latter characterisation shall be accepted.

According to Fitzallen & Brown (2007, p. 3), from this perspective, evidence-based research in education relates to research which:

> *"…exploits qualitative research methods … to explore the relationship between contextual factors within complex learning environments … The focus … tends to be from a more practice-based perspective that takes into account the context of classrooms and learning environments. It often utilises sustained observation and interviewing to explore the realities of classroom practice"*

Furthermore, Fisher (2005, p. 165-166) identifies that "qualitative/deep research on the … design of learning environments … needs to be developed with classroom teachers to ensure its relevance to learning … [and] with the 'students as researchers'". Based on these perspectives, it is clear that this study, which was developed with teachers, involved students as co-researchers, and utilised sustained observation and interviewing to explore the complex relationship between the learning environment and engagement for students with profound autism, can be considered to have successfully fulfilled its aim: to employ evidence-based research to develop a learning environment which supports students with profound autism to engage as effective learners. This research thus provides a compelling illustration of the potential value of small-scale school-based qualitative research projects to inform evidence-based practice in education and transform educational practice. Indeed Punch (2009, p. 43) claims that:

> *"…small-scale projects can also make important contributions … their findings and insights can inform larger projects … knowledge in any field, but especially in a professional field such as education, usually progresses through the accumulation of evidence across many studies, rather than because of one large-scale definitive project, and small-scale research has much to contribute here."*

12.2.2 Build an Evidence-Base of Features of the Classroom Learning Environment which Influence Engagement in Students with ASDs

As described through chapters 9, 10 & 11, this study successfully built an evidence-base of features of the classroom learning environment which influence engagement in students with ASDs, and addressed the question of 'what features of the classroom learning environment, (with a focus on the physical environment of the classroom), influence engagement in students with ASDs?'. An overview of the key issues which required consideration, and the resolutions which were identified, are presented in

Table 12.1. In addition, the PAR meta-spiral presented in Appendix 10 clearly illustrates the evidence-base collated through the PAR phases of this research.

Collectively, the findings of this research clearly outline the potential benefits which can be gained from providing students with profound autism with a specifically designed educational environment. The photographs of the new school building (provided in chapters 9, 10 and 11), visibly illustrate how the evidence-base developed through this research was utilised to produce tangible outcomes through successfully informing the design of a new school for students with profound autism. In addition, the attached CD provides a comprehensive overview of how this evidence-base can be used to inform the design of a learning environment which supports students with profound ASDs to engage as effective learners.

As discussed in section 11.6, through exploring the development of a learning environment to support students with profound autism to engage as effective learners, this research has developed an emerging theoretical model which corroborates the key issues identified through the literature as requiring consideration when developing a learning environment to support students with profound autism, namely:

- the physical environment
- the teaching approach and resources
- the social environment (adults & peers)

Moreover, the additional insight gained through this research suggests that in order to support the engagement in learning of students with profound autism through providing a supportive physical environment, there are 12 key considerations to be addressed:

- Sensory processing difficulties
- Sensory regulatory difficulties
- Interoceptive dysfunction
- Challenging behaviour
- Individual needs
- Teaching approach
- Social impairments
- Stereotypical behaviours

- Lack of sense of danger
- Independence
- Learning styles & needs
- Staffing requirements

Many of these issues have to date received considerable attention from researchers in the field of autism, however as discussed in chapter 3, the focus has generally been to explore the aetiology and symptomatology of autism rather than their educational implications, and studies have frequently investigated only a single aspect in detail. In contrast, this research has adopted a holistic educational perspective in order to identify how to provide a supportive learning environment for this complex population of students which addresses the wide spectrum of their needs.

Nevertheless, some of the most recent research has begun to explore the design of learning environments for students with autism from an architectural perspective. Whilst these studies were not designed to involve the students themselves as co-researchers as undertaken in this study, they have nevertheless produced valuable conclusions which provide strong support for the findings of this research. A study by Khare & Mullick (2009b) identified 18 design parameters to inform the design of enabling environments for students with autism, many of which, as can be seen, support the conclusions of this research:

- "Provide Physical Structure
- Maximize Visual Structure
- Provide Visual Instructions
- Offer Opportunities for Community Participation
- Present Opportunities for Parent Participation
- Present Opportunities for Inclusion
- Maximize Future Independence
- Offer Generous Space Standards
- Provide Withdrawal Spaces
- Maximize Safety
- Maximize Comprehension
- Maximize Accessibility
- Provide Assistance
- Maximize Durability and Maintenance
- Minimize Sensory Distractions
- Provide Sensory Integration
- Provide Flexibility
- Provide Monitoring for Assessment and Planning" (Khare & Mullick, 2009b, p. 48)

In addition, a study by Mostafa (2008, p. 197), concluded that:

> *"The overall results of this study show promising indications of the possible improvement of autistic behaviour, as indicated by increased attention span, reduced response time and improved behavioural temperament, using an altered architectural environment. These indicators, when combined, create a behavioural environment more conducive of learning and may increase the autistic child's opportunity for skill acquisition and development."*

It therefore seems clear that due to the methodological approach used and the educational perspective from which this research was undertaken, the findings of this research provide a unique and comprehensive evidence-base which holds the potential to be an essential resource to support teachers and other professionals to provide an optimal learning environment for students with profound autism. Moreover, this is an evidence-base which is gradually beginning to be reiterated by other research in the field of autism.

Despite the overall success of this research in fulfilling this objective, a few issues did contribute to specific limitations within the findings. For example, time constraints imposed by the imminent requirement for the research school to 'go to tender' and for the design of the new school to be finalised, resulted in data collection commencing earlier than would have been chosen under ideal conditions. Furthermore, delays resulting from hold-ups in receiving items from the variety of companies contacted to source interventions were also experienced. In addition, financial limitations precluded some modifications from being incorporated within the PAR spiral, as well as preventing certain findings from being implemented in the new school design. However, such issues are unavoidable when undertaking 'real-life research'. According to Robson (2002, p. 7),

> *"…issues to do with change (How can it be implemented? What are the barriers to implementation? How might they be overcome?) often loom large … one possible stance is that the researcher's responsibility stops with achieving some understanding of what is going on, and communicating that information to those directly concerned."*

Since the issues outlined above were beyond the researcher's control, this was the stance adopted for the present research.

With regards to the surveys, the absence of any responses from parents approached requires specific consideration. One possible factor which may have influenced the absence of responses from parents is that families of children with autism have been found to experience higher levels of stress than parents of children with other disabilities (Davis & Carter, 2008), and many report feeling that their child is not

emotionally attached to them (Akshoomoff & Stahmer, 2006). Consequently, it is possible that for these reasons parents may have been disinclined to respond to the questionnaire.

Nevertheless, despite this possibility, it is also likely that the methodological approach employed also negatively affected the response rate from parents. Within the present study, since the school was residential and all the students involved in the study had 52-week placements, parents were informed of the details of the study and approached for written consent for their children's involvement in the project through postal correspondence. Since this was successful, the decision was made to approach parents in the same way to participate in the research questionnaire, as well as providing the additional option for them to fill in the questionnaire online to save time. With hindsight, it is clear that due to the residential context in which this research took place, approaching the parents in this way prevented the researcher from establishing a rapport. Consequently it is likely that this negatively influenced the questionnaire response rate.

Research suggests that to support parents to be involved in their children's education it is important to provide parents with a "welcoming school climate" and create specific opportunities for parents to participate in the child's school program (Hoover-Dempsey et al., 2005, p. 117). Furthermore, Benson, Karlof & Spirstein (2008, p. 47) found that parental involvement was "heavily influenced by the extent to which school staff actively encouraged, assisted and provided opportunities for parent involvement." It is therefore possible that had the researcher approached the parents through telephone contact or a home visit, and assisted them to participate in the research more actively through interview, this may have yielded a better response rate from the parents. Consequently, a follow-up study specifically aimed at establishing the parents' views regarding the provision of an optimal educational environment for their children would be an essential area for future research. Furthermore, it is also important to recognise that other family members may also play an important role in the lives of children with autism, and thus inviting siblings, grandparents, uncles, aunts and other significant individuals to participate within such a study would also be crucially important.

Another issue which requires consideration is that of the findings from the direct student voice evaluation. As discussed in section 11.1, specially adapted methods of

obtaining the students' views directly were employed. However, whilst the camera task was largely successful, the Talking Mat task failed to produce consistent findings. It is generally acknowledged that "due to the behaviours and communication issues experienced by some people with learning disabilities, they may impact on the results, level of analysis possible and the findings" (Brown, 2007, p. 127). Consequently, it is likely that the contributions from the students were affected by the nature of their disability.

In particular, recent studies suggest that individuals with autism show a reduced or absent self-reference effect (Henderson et al., 2009; Lombardo et al., 2009; Lombardo, Barnes, Wheelwright & Baron-Cohen, 2007; Toichi et al., 2002). Research by Heerey, Keltner & Capps (2003) revealed that individuals with autism have a deficit in self-referential emotion understanding. In other words, they "have difficulty in understanding and describing their own emotions and have an externally (rather than internally) focused style of thinking" (Lombardo & Baron-Cohen, 2010, p. 395). Consequently, this may have made the Talking Mat task of sorting the photographs according to whether they liked or disliked them extremely challenging.

In addition, Murphy & Cameron (2002, p. 13) suggest that "it may be useful to use a 'starter' topic to help clients understand how to use the mats … It allows your client to practice using the mats and builds confidence." Within the present research, opportunities for the students to practice using the Talking Mats were not provided, since previous research at the school had established that:

> *"This resource had been utilised by both the Speech and Language Therapist and the resident counsellor … for some time with a range of students. Therefore, in addition to its inherent benefits, it was both reliable and familiar as a technique to enable students to express ideas, feelings and emotions*" (Whitehurst, 2007, p. 35).

Nevertheless, it is possible that for the students involved in this research, the absence of this practice opportunity in preparation for the research task may have limited their ability to effectively access this student voice technique. It would therefore be useful for future research in this area to focus on familiarising the students with the selected methodologies, and provide regular opportunities to teach them how to use them, prior to utilising the methods to inform the research findings.

Within the PAR spiral, the only unsuccessful intervention was that of introducing Intensive Interaction into the classroom. One possible reason for this relates to the social impairments characteristic of autism, since as highlighted in section 3.2, individuals with autism often show a deficit in social orienting – the desire to spontaneously (or upon request) direct attention to another person. However, since the students were observed to respond positively when opportunities for II arose, this explanation seems unlikely.

Another possible explanation relates to the workload of the staff and the volume of resources required to provide suitably differentiated lessons for these students. The teacher and teaching staff were frequently observed to utilise times when the students were in choice to undertake lesson preparation such as preparing work sheets, cutting out pictures and symbols and laminating resources. Consequently, the teaching staff were frequently busy and unavailable for interaction with the students during choice time, which limited the opportunities available to undertake II.

A third possible reason relates to the fact that this modification, unlike any other, required 'teacher change'. The process of teacher change is an area which has attracted much investigation, and a number of factors have been highlighted which affect teacher change. According to Smith, Hoper, Gillespie, Solomon & Rowe (2006, p. 227), "a significant body of research exists on the social psychology of teachers, some of which is relevant to the question of whether teachers' experience, dispositions, and motivations support or prevent them from learning and changing."

It is therefore likely that the failure of this intervention reflects a combination of issues relating to workload and teacher change, rather than representing a failure of II. This is supported by the fact that previous research has consistently shown II to be effective at improving the pre-speech, speech and early social skills of individuals with autism (Nind & Powell, 2000; Nind, 2000). Indeed Swinton (2008) outlines that:

> *"Students demonstrated improvements in eye contact, initiation of interactions with staff, understanding of gesture and speech and, on several occasions, interactions with peers which had not occurred previously. There was also a reduction in challenging behaviours as the students begun to communicate more effectively."*

Finally, in order to inform the design of the new school and contribute towards a body of knowledge which is at present both limited and largely discursive, the primary focus

of this research was the physical environment. Nevertheless, both the literature review and the findings of this research clearly suggest that the development of a supportive learning environment for students with autism necessitates consideration of two additional factors: the teaching approach and resources and the people in the environment. Consequently, further studies exploring these areas (for example, the influence of peer groups on the engagement and learning of students with profound autism) would be an important area for future research.

12.2.3 Devise Engagement Scales Sensitive to the Learning Profiles of Children with ASDs

As discussed in section 7.6, novel engagement scales were devised for use in the present study in an attempt to ensure sensitivity to the unique learning styles of students with autism. Thus this research successfully fulfilled its objective to devise engagement scales sensitive to the learning profiles of children with ASDs. The scales were based upon a selection of previously designed and successfully employed scales since it was anticipated that through combining elements of existing scales this would enhance the trustworthiness of the novel scales. Through successfully devising, piloting and using novel scales specifically designed to be sensitive to the learning profiles of students with autism, this research effectively addressed the research question of 'what does an engagement scale sensitive to the learning profiles of students with ASDs look like?'.

However, it is important to acknowledge the limited extent to which it was possible to pilot the scales and assess inter-observer reliability. Consequently, whilst the findings did indicate a high level of inter-observer reliability, and the scales were successfully used to chart the students' engagement throughout the second phase of this research, further studies examining the application of these scales to a wider population of students with profound autism would certainly be of benefit to consolidate the trustworthiness of these scales.

Nevertheless, the successful application of the concept of engagement within the present study in order to identify elements of a supportive learning environment for students with ASDs and subsequently enhance student engagement, represents a key area of achievement for this study and suggests significant implications for the field of education. Firstly, this study serves to validate the growing emphasis being placed by

educators and researchers on engagement as a crucial indicator for effective learning (see chapter 4). Secondly, this in turn highlights the growing need for effective practitioner tools to profile and measure students' engagement in learning as a pathway to enhancing effective learning. Thirdly, as discussed in section 11.6.2, the theory developed through this research suggests that to be most effective, a practitioner tool developed to measure and enhance student engagement must enable a process of 'personalising engagement' through sensitivity to and recognition of the specific engaged/disengaged behaviours displayed by individual students in order to identify personalised pathways to effective learning.

Thus, whilst the scales developed and utilised in the present study were designed to be sensitive to the learning styles of students with autism in general, and require significant adaptation to be applied as a tool for 'personalising engagement', the concept of adapting measures of engagement to be sensitive to the learning profiles of specific populations of students nevertheless provides a useful starting point on which to build future tools which enable 'personalising engagement' for individual students. Moreover, the development of such tools is currently a particular area of focus for a UK government-funded project investigating the development of meaningful pathways to personalised learning for students with complex learning difficulties and disabilities.

12.2.4 Evaluate the Influence of Trialled Modifications on Student Engagement Through Engagement Scale Data Triangulated with Other Data.

As described through chapters 9 and 10, the influence of a number of modifications introduced into the research classroom were evaluated throughout the course of this research through a combination of engagement scale data, observations of student behaviour and staff feedback. As such, this research successfully addressed the question of 'what influence do trialled modifications have on student engagement?'. The findings suggest that the methods selected collaborated effectively to evaluate trialled modifications, since according to Keen (2009, p. 136),

> *"…the study of engagement has the potential to assist educators and therapists to maximise learning outcomes by:*
> *(a) recognising …when a child is engaged …*
> *(b) increasing knowledge and awareness of factors that may enhance engagement … and … ways of manipulating those variables… and*
> *(c) recognising when a child is disengaged"*

Within the present research, each of these criteria was effectively met, since the research recognised when students were disengaged (e.g. rocking on the class chair), gained increased knowledge and awareness of ways to manipulate this variable in order to enhance engagement (e.g. researched and introduced anti-tilt chairs) and then successfully recognised when student engagement improved.

Overall, the modifications to the learning environment trialled through the PAR phases of this research were consistently successful in improving student engagement throughout the course of this research. Since this research was successful in enhancing both individual student engagement and group engagement through a variety of modifications to the learning environment, this study clearly shows that, as indicated by the literature (see chapter 4), the learning environment is an essential resource to enhance engagement in learning. Furthermore, for students with profound autism in particular, as anticipated from the literature review, this research clearly illustrates that adaptations to the learning environment which address the sensory-perceptual and social impairments characteristic of autism, as well as targeting their unique learning styles and needs, can support them to engage as effective learners and fulfil their learning potential.

12.3 The Debate Surrounding 'Autism-Friendly' Environments

Despite the evidence cited through this thesis, some professionals and academics argue that general environmental accommodations should not be made to facilitate individuals with autism. The reasons cited for this are either that

1. it is not possible to provide an environment which is supportive for all individuals with autism since their sensory difficulties manifest in individual ways, or
2. providing an 'autism-friendly' environment does not prepare individuals with autism to cope with 'normal' environments and 'life in the real world'

Advocates of the first argument, Jordan & Powell (1995, p. ii) claim that "if educationists try to follow a 'recipe', then, they will sooner or later come across a child or a situation where the recipe does not work." Similarly, whilst Henry (2006) and Breakey (2006) do encourage developing autism-friendly environments, they nevertheless recognise that "every child perceives each one of these sensory systems differently…the range of complex sensory perceptual systems makes designing environments for people with

autism difficult" (Henry, 2006, p. 9) and that "the individual nature of autism means that each autistic person may react differently to sensory stimulation and overload. Building design accommodates the needs of the group and has to take many competing factors into account" (Breakey, 2006, p. 136).

Whilst it is certainly true that autism is a spectrum disorder, and it is essential to recognise that sensory difficulties manifest differently in each individual, the evidence provided in this thesis would seem to support the view of Humphrey (2005, p. 6) who states that:

> *"…there can be a common thread as to how you approach the design of a space, which will help with the setting for these people in order that they may respond more positively to personal teaching and therapies. This common thread being based on some common principles and values for humanity and also common traits in autism."*

and Beaver (2006) who reiterates this, stating "all buildings and clients are different but there is a vast list of needs that are common to any building designed for this [autistic] user group."

Consequently, whilst this research recognises "the importance of providing a dynamic design" (Henry, 2006, p. 16) and acknowledges the importance of developing a learning environment for students with profound autism which emphasises flexibility and adaptability to meet individual needs, the author nevertheless maintains that it is possible and beneficial to develop general guidelines for the design of learning environments which are supportive to the vast majority of individuals with autism.

Proponents of the second view – that providing an 'autism-friendly' environment does not prepare individuals with autism to cope with 'normal' environments and 'life in the real world' - include Jordan (2005, p. 109) who argues that "the problem … is that these very specialist … approaches have implications for later inclusion, in that the more they differ from that provided for other children, the harder it may become to successfully effect integration into 'typical' settings." However, this is a view vehemently opposed by other professionals, for example Breakey (2006, p. 136) argues that:

> *"Many practitioners take the 'realistic' view that people with autism have to live in the real world so the solution to their problems of sensory overload lies in 'desensitisation'. In other words, they have to get used to it. If we apply this view to the area of physical disability, then it becomes transparently discriminatory and unacceptable. No one would suggest that physically disabled*

> *people should 'get on with' climbing stairs … In the same way, we should not suggest that buildings should not attempt to accommodate autistic users."*

In addition, this argument also appears to conflict with advice issued in government policy. 'Removing Barriers to Achievement' (2004b, p. 50) outlines that "we will put children with SEN at the heart of personalised learning." In addition, the Disability Discrimination Act (1995) emphasises that it is important to make 'reasonable adjustments' to support individuals with disabilities. Furthermore, the NAS claim that "it is important to understand the difficulties that people with autism face, how they are affected by their environment, and to think about how different environments can be adapted to make them less confusing or challenging" (Nguyen, 2006, p. 3).

Consequently, this research supports the view of Mostafa (2008, pp. 191-192) who states that:

> *"…autistic behaviour can be influenced favourably by altering the sensory environment, i.e. the stimulatory input, resulting from the physical architectural surroundings (colour, texture, ventilation, sense of closure, orientation, acoustics etc) … [and] a more conducive environment created, for more efficient skill development."*

This is also a view advocated by Mullick & Khare (2008, p. 96) who propose that the "performance of pupils with autism is enhanced in appropriate physical environment." Furthermore, these authors also affirm that (2008):

> *"…although abilities and behavioural patterns exhibited by an individual can vary enormously, there are considerations among most children that require special attention. These considerations provide a sensitive base, which has the ingredients to meet the needs and enhance learning…"*

In addition, a further possible benefit of providing a low arousal environment is that, as explained by Henry (2006, p. 7) "an appropriate environment for a particular individual may include filters for harmful noises, but also allow these harmful noises to slowly be reintroduced at incremental levels until they are no longer harmful." In this way through the provision of a low arousal environment it may be possible to provide individuals with autism with controlled opportunities to gradually overcome their sensory sensitivities, enabling them to cope with the very 'normal' environments and 'life in the real world' which opponents of the development of autism-friendly environments argue they must. These arguments suggest that by providing students with autism with a specifically designed environment, their engagement in learning can be increased,

resulting in improved learning, greater acquisition of skills, and more opportunities for focused and effective participation.

12.4 Main Findings

It would thus seem that the present research provides a comprehensive evidence-base with which to inform the design of a learning environment to support students with profound autism to engage as effective learners. This evidence-base is presented in overview within Table 12.1 below, and should be read in conjunction with the virtual classroom presented on the attached CD.

Issue	Resolution
PHYSICAL ENVIRONMENT	
Upholstery	- robust contract upholstery - neutral solid colour - waterproof - soft to touch
Toilet facilities	- 'boxed-in' (hidden) cistern and sink - neutral solid colour - sufficient space for changing - accessible from the classroom - shower available - staff-controlled water supply
Artificial lighting	- modern electronic ballast fluorescent lighting - 'daylight' spectrum lighting - louvers - indirect lighting systems - day-light sensing dimmers - coloured gel overlays for individual students
Laminate	- matt preferable to glossy
Group / 1:1 work tables	- heavy, robust materials - curvilinear design - neutral solid colour - uniform design - matt finish - flexible compartmentalised design - adjustable height - sound-absorbing material - large enough to accommodate high student:staff ratio - bespoke furniture e.g. designed by Tough Furniture

Issue	Resolution
Independent workstations	- heavy, robust materials - curvilinear design - neutral solid colour - matt finish - clean-cut, uniform, 'all-in-one' design - flexible 'toolkit' design - adjustable & removable screens - sound-absorbing material - large enough to accommodate TEACCH structure and large concrete tasks - bespoke furniture e.g. designed by Tough Furniture
Rocking chairs	- safe: no legs - robust materials - neutral solid colour - waterproof / removable covers - e.g Lchair, Ball chair
Other sensory integration equipment	Have sensory integration equipment available e.g.: - physiotherapy balls - trampettes - indoor swings - tents - weighted blankets
Equipment and opportunities for physical exercise	Organise a regular exercise program e.g.: - 20 minute walk every morning and afternoon Have indoor exercise equipment available e.g.: - exercise bike Have outdoor play areas which are: - accessible from the classroom - safe for students to play independently - sheltered from rain
School chairs	- anti-tilt design - robust materials - neutral solid colour - e.g Titan Chair
Flooring	- robust, durable material - sound absorbent material - neutral solid colour - easily cleaned - pleasant to sit on - non-reflective - e.g. Flotex flooring
Other acoustical considerations	- low, slatted ceilings - insulation - soft sound-absorbing furnishings - contact Glazzards Architectural Firm for more information

Issue	Resolution
Classroom structure	- two rooms rather than one - no corridors between rooms - designated spaces for different activities such as group work, 1:1 work, independent work
Chill out room	- attached to every classroom - padded and insulated - observation mirror - neutral solid colour interior
Storage	- designated space attached to every classroom - not within the classroom - sufficient space to store resources and paperwork
Classroom size	- large classroom size - appropriate ceiling height and furnishings
Computer storage	- concealable computer-storage facility - robust materials - neutral solid colour - screened sides - curvilinear
Kitchen area	- attached to every classroom - concealable and lockable - staff controlled water supply
'Circulation space' corridors	- wide - curvilinear - neutral solid colour - socialisation seating areas
Walls	- neutral solid colour - curvilinear design
Security features	- auto-lock external doors
TEACHING APPROACH & RESOURCES	
Interactive whiteboard	- have available in every classroom - install a sharp angle or back-lit projector - ensure the whiteboard is not opposite a window - provide black-out blinds
Intensive interaction / responsive teaching	- be available to interact with students - respond to and praise any attempts at communication - have areas in the classroom which promote and facilitate interaction
Other teaching approach factors	- ensure teaching approach and resources are appropriate - use a variety of approaches - personalise teaching - making learning meaningful and motivating - target students' learning styles and preferences - benefits of the TEACCH approach

Issue	Resolution
PEOPLE IN THE ENVIRONMENT	
Staff-related factors	- number and consistency of staff - staff knowledge of autism / individual students / teaching approaches - staff attitude - staff approach
Student-related factors	- number of students - grouping of students - internal student factors

Table 12.1: Features requiring consideration when developing a learning environment to support students with profound autism to engage as effective learners

It is therefore clear that this research provides strong evidence to support previous research and literature highlighting the considerable influence that the learning environment can have on engagement in learning for students with autism.

12.5 Recommendations

Based on the findings of this research study, the following recommendations are suggested:

1. For this research, alongside other existing and future research in the field to be used to inform the development of Government guidelines and regulations for the design of educational environments for students with autism
2. The integration of these guidelines to inform the Building Schools for the Future programme and the subsequent renovation or rebuilding of existing educational provisions for students with autism
3. Within the context of the mandatory annual review for students with SEN, it is pertinent to report on the sensory issues of students with ASDs and how these can be addressed through 'reasonable adjustments' (Disability Discrimination Act, 1995) to the learning environment
4. Following the Salt Review (2010), teacher training in special education is going through fundamental reorganisation. It is therefore timely to include statutory modules on autism within initial teacher training, and professional development courses for all qualified teachers
5. Teachers need to be empowered to create 'engagement in learning' profiles sensitive to the unique engaged behaviours of individual students in order to

enhance their learning. Further research to adapt the engagement scales devised in the present study to enable 'personalising engagement' would prove a helpful starting point to achieve this goal

12.6 Conclusion

This study has achieved many pioneering outcomes. Through using the literature on the neuroscience of autism to inform the focus and direction of this research, this study clearly reveals the significant contribution which research in neuroscience can make to the education of students with autism. This highlights how essential it is for both educators and researchers in the field of autism to make a conscientious effort to traverse the existing research-to-practice gap in order to maximise learning for this complex population of students. In addition, the research undertaken through this study plainly reveals the benefits which can be produced through undertaking evidence-based research to inform evidence-based practice in education. It is therefore evident that this an important future focus for researchers and practitioners in the field of education.

This study has also effectively evidenced the essential role that engagement plays in the education of students with disabilities such as autism. As mentioned in section 7.6, the practitioners approached through this research consistently reiterated that *'engagement is essential for learning'* (34). Furthermore, the successful application of engagement within the present study also clearly proves that the physical learning environment is an essential resource to promote the engagement in learning of students with profound autism. In addition, this study has successfully extended current thinking in the field of engagement through highlighting the importance of personalising engagement in order to support specific populations of students (as was undertaken through this research), or individual students (as proposed for future research in the field), to fulfil their learning potential.

Finally, this research has successfully developed an evidence-base with which to inform the design of learning environments for students with ASDs, an area in which evidence-based research is at present distinctly lacking. Furthermore, this research has theorised 12 key considerations which can be used by schools renovating or building educational facilities for students with autism in order to assist them to consider the wide-ranging needs of this complex population of students in order to

design an educational environment which is truly personalised to meet the needs of the students for whom it is intended. The pioneering work of six children with profound ASDs who acted, alongside practitioners, as collaborators and co-constructors of the learning environment, has ensured that the outcomes of this study are grounded in the reality of their daily lived educational experiences. Their legacy is there for others to take up; it is a legacy that has the potential to transform the ASD educational landscape.

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APPENDIX 1.1

LEARNING ENVIRONMENTS INTERVIEWS CONSENT FORM

Developing a learning environment which supports children with profound autistic spectrum disorder to engage as effective learners

- I have been informed of and understand the purposes of the study
- I have been given an opportunity to ask questions
- I understand I can withdraw at any time without prejudice
- Any information which might potentially identify me will not be used in published material
- I agree to participate in the study as outlined to me.

NAME .....

SIGNATURE .....

DATE .....

APPENDIX 1.2

LEARNING ENVIRONMENTS QUESTIONNAIRES CONSENT FORM

Developing a learning environment which supports children with profound autistic spectrum disorder to engage as effective learners.

- I have been informed of and understand the purposes of the study
- I have been given an opportunity to ask questions
- I understand I can withdraw at any time without prejudice
- Any information which might potentially identify me will not be used in published material
- I agree to participate in the study as outlined to me.

I would/would not be willing to participate in follow-up interviews to explore these issues further.

NAME .....

SIGNATURE .....

DATE.....

APPENDIX 1.3

LEARNING ENVIRONMENTS QUESTIONNAIRES INFORMATION SHEET

My name is Tammy Brooks, and I have been working at [redacted] since October 2006, undertaking research to develop a learning environment which supports the children at [redacted] to engage as effective learners.

As with all research carried out at [redacted], the aim of this research is to improve the quality of care and education that the children here receive. Ultimately, this research will be used to inform the design for the new school, and thus will have tangible benefits for both the staff and children at [redacted].

I am very aware that as staff at [redacted], you are negotiating on a daily basis with the restrictions and limitations imposed by the current learning environments, and thus have much valuable information and experience to contribute to the design of the new school.

The main topics around which my questions are designed are the teaching pedagogy, the physical environment of the classroom, and the teaching staff.

Participation is completely voluntary, and you are at liberty to withdraw at any time, without prejudice or negative consequences.

This research is strictly confidential and no-one at [redacted] will be privy to the raw data I collect. Any reports written in the course of my research may enter the public domain, however individual persons will not be identifiable. This research has full approval from the [redacted] Ethics Committee.

Should you require any further information regarding this project, or wish to ask any questions, please feel free to contact me on [redacted]

I would like to thank you very much for your participation.

Helpful Information

Engagement is defined for the purposes of this study as:
developmentally appropriate interactions with the environment, including materials and people.

The **Learning Environment** is defined for the purposes of this study to include:

- the physical environment of the classroom
- the teaching approach and resources
- the classroom staff.

APPENDIX 2

LEARNING ENVIRONMENTS INTERVIEW SCHEDULE

Introductory Information:
What age are the students you teach?
How many students are in your classroom?
How many staff work in your classroom?

Engagement & Learning
What do you consider to be the link between engagement (defined as developmentally appropriate interactions with the environment, including materials and people) and learning?

What indicators do you use to determine whether students are engaging in class activities?

What do you feel prevents some students from fully engaging in learning?

From your experience, what elements of the learning environment have the greatest influence on student engagement – can you give examples?

The New School
What are your aspirations for the design of classrooms in the new school?

Current Classrooms
-Physical Environment
What key words would you use to describe the physical environment of your current classroom?

Have you made any changes to your classroom environment in order to enhance engagement - Can you give examples?

-Teaching Pedagogy
What main teaching approaches do you use to support the students to engage in learning? – expect TEACCH & PECS/Makaton or Intensive Interaction

How do you feel that these approaches influence the students' engagement? – Can you give examples?

Are there any other teaching approaches/strategies or techniques which you use, have used, or would like to use to engage students in learning? - Can you give examples?

-Other
Are there any other aspects of the classroom learning environment which you have found to influence student engagement – can you give examples?

APPENDIX 3.1

QUESTIONNAIRE TO TEACHING ASSISTANTS

NAME: (optional) .....
DEPARTMENT: ..... **POSITION:** .....

Engagement & Learning

What do you consider to be the relationship between engagement (for definition please see Information Sheet) and learning?

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What indicators do you use to determine whether a child/young person is engaging in an activity?

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What do you feel prevents some children/young people from fully engaging and learning?

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What elements of the learning environment (for definition please see Information Sheet) do you feel have the greatest influence on a child/young person's engagement – can you give examples?

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The New School

What are your aspirations for the design of classrooms in the new school?

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-Physical Environment

How do you feel that the physical environment of a classroom/room in which learning is expected to take place influences a child/young person's engagement?

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Have you made any changes to a class/learning-room environment in order to enhance a child/young person's engagement - Can you give examples?

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-Teaching/Instructional Approach

What main teaching/instructional approaches have you used or seen used to support the children/young people to engage in learning?

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How do you feel that these approaches influence the children/young peoples' engagement? – Can you give examples?

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Are there any other approaches which you have used or would like to use/see used to engage children/young people in learning?-Can you give examples?

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-Other

Are there any other aspects of the learning environment which you feel influence engagement – can you give examples?

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APPENDIX 3.2

QUESTIONNAIRE TO PSYCHOLOGY & THERAPIES TEAMS

NAME: (optional) .....
DEPARTMENT: ..... **POSITION:** .....

Engagement & Learning

What do you consider to be the relationship between engagement (for definition please see Information Sheet) and learning?

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What indicators do you use to determine whether a child/young person is engaging in an activity?

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What do you feel prevents some children/young people from fully engaging and learning?

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What elements of the learning environment (for definition please see Information Sheet) do you feel have the greatest influence on a child/young person's engagement – can you give examples?

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The New School

What are your aspirations for the design of classrooms in the new school?

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-Physical Environment

How do you feel that the physical environment of a classroom/room in which learning is expected to take place influences a child/young person's engagement?

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Have you made any changes to a class/learning-room environment in order to enhance a child/young person's engagement - Can you give examples?

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-Teaching/Instructional Approach

What main teaching/instructional approaches have you used or seen used to support the children/young people to engage in learning?

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How do you feel that these approaches influence the children/young peoples' engagement? – Can you give examples?

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Are there any other approaches which you have used or would like to use/see used to engage children/young people in learning?-Can you give examples?

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-Other

Are there any other aspects of the learning environment which you feel influence engagement – can you give examples?

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APPENDIX 3.3

QUESTIONNAIRE TO CARE STAFF

NAME: (optional) .....
HOUSE: ..... **POSITION:** .....

Engagement & Learning

What do you consider to be the relationship between engagement (for definition please see Information Sheet) and learning?

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What indicators do you use to determine whether a child/young person is engaging in an activity?

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What do you feel prevents some children/young people from fully engaging and learning?

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What elements of the learning environment (for definition please see Information Sheet) do you feel have the greatest influence on engagement – can you give examples?

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The New School

What are your aspirations for the design of classrooms in the new school?

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-Physical Environment

How do you feel that the physical environment of a room in which learning is attempting to take place influences a child/young person's engagement?

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Have you made any changes to a room/environment in order to enhance a child/young person's ability to engage and learn - Can you give examples?

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-Teaching/Instructional Approach

What main teaching/instructional approaches have you used or seen used to support children/young people to engage in learning?

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How do you feel that these approaches influence the child/young persons' engagement? – Can you give examples?

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Are there any other approaches which you have used or would like to use/see used to engage children/young people in learning?-Can you give examples?

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-Other

Are there any other aspects of the learning environment which you feel influence children/young peoples' engagement – can you give examples?

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APPENDIX 3.4

QUESTIONNAIRE TO PARENTS

NAME: (optional)

Introductory Information:
Student's current age: .....
Student's age upon referral to [redacted]: .....
Student's Diagnosis: .....

Participation & Learning
How would you decide if your child is participating (for definition please see 'Helpful Information') in an activity?
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Are you aware of anything that prevents your child from participating in activities?
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The New School
What do you hope the new school will achieve for your child?
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Is there anything you would like to see in the classroom to help achieve this?
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The Classroom:
Throughout your child's education, have you become aware of anything within the classroom (for definition please see 'Helpful Information') which has affected your child's ability to participate and learn - can you give examples?
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Can you think of any occasions throughout your child's education when the physical environment of the classroom has impacted upon their ability to participate and learn – can you give examples?

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Can you think of any teaching approaches which have been used throughout your child's education, either at home or at school?

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Do you know if these approaches were successful or unsuccessful in assisting your child's participation in school activities? – Can you give examples?

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-Other

Are there any other aspects of the environment which you have found to influence your child's ability to participate in learning – can you give examples?

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APPENDIX 4.1

1-1 WORK ENGAGEMENT SCALE

Date..... No. of children .....

Time ..... No. of adults .....

Child .....

Time	Active	Passive	Ritualistic	P-Non	A-Non
15s					
30s					
45s					
1m					
1m15s					
1m30s					
1m45s					
2m					
2m15s					
2m30s					
2m45s					
3m					
3m15s					
3m30s					
3m45s					
4m					
4m15s					
4m30s					
4m45s					
5m					

NOTES:

APPENDIX 4.2

INDEPENDENT WORK ENGAGEMENT SCALE

Date..... No. of children .....

Time ..... No. of adults .....

Child .....

Time	Active	Passive	Ritualistic	P-Non	A-Non
15s					
30s					
45s					
1m					
1m15s					
1m30s					
1m45s					
2m					
2m15s					
2m30s					
2m45s					
3m					
3m15s					
3m30s					
3m45s					
4m					
4m15s					
4m30s					
4m45s					
5m					

NOTES:

APPENDIX 4.3

GROUP WORK ENGAGEMENT SCALE

Date..... No. of children .....

Time ..... No. of adults .....

Activity .....

Time	Active	Passive	Ritualistic	P-Non	A-Non	Out of sight
30s						
1m						
1m30s						
2m						
2m30s						
3m						
3m30s						
4m						
4m30s						
5m						
5m30s						
6m						
6m30s						
7m						
7m30s						
8m						
8m30s						
9m						
9m30s						
10m						

NOTES:

APPENDIX 4.4

CHOICE TIME ENGAGEMENT SCALE

Date..... No. of children .....

Time ..... No. of adults .....

Time	Authentic - P	Authentic - M	Ritualistic	Non-Engaged	Out of sight
30s					
1m					
1m30s					
2m					
2m30s					
3m					
3m30s					
4m					
4m30s					
5m					
5m30s					
6m					
6m30s					
7m					
7m30s					
8m					
8m30s					
9m					
9m30s					
10m					

NOTES:

APPENDIX 4.5

ORIGINAL 1-1 WORK ENGAGEMENT SCALE

Date..... No. of children .....

Time ..... No. of adults .....

Child .....

Time	Active	Passive	Prompt	Ritualistic	P-Non	A-Non
15s						
30s						
45s						
1m						
1m15s						
1m30s						
1m45s						
2m						
2m15s						
2m30s						
2m45s						
3m						
3m15s						
3m30s						
3m45s						
4m						
4m15s						
4m30s						
4m45s						
5m						

NOTES:

APPENDIX 5

LEARNING ENVIRONMENTS INTERVIEW TRANSCRIPT: T5

TB: **What age are the students that you teach?**

GH: I've got 6, there's one is 12, I've got 1 at 13, 2 at 14 and 2 at 15. So 12 to 15.

TB: Wow, that's quite a big age range.

GH: Hmm, they're all quite similar ability though.

TB: Right, OK. **How many students are in your classroom?**

GH: 6. I've got one in a different class. So I've got 5 in the main class and 1 out in a 1:1 education program.

TB: Ok fine, **how many staff work in your classroom?**

GH: Umm, 6 including myself, over the 2 sites.

TB: Yeah, Ok. How many on this site then?

GH: There's 2 with [redacted] and 4 in here with 5 students.

TB: Right Ok. So, for my project, I've been looking at engagement and learning, **What do you consider to be the link between engagement and learning**? And there's a quick definition of how I'm using it for my project.

GH: Umm. That's a big question isn't it! Obviously there's a very strong link between the two. I don't think that umm children are really able to learn very effectively if the environment isn't right and the set up isn't really right for them. Umm, particularly, if there will be things like distractions and things, sensory things in the environment, particularly with children with autism, it's just, it's not gonna happen, if you've got some nice crinkly bits of paper right next to you and you're trying to do something, the crinkly bits of paper are gonna be much better and much more interesting than whatever boring thing your teacher would like you to do at that particular moment in time. Umm, so yeah I think there's a very strong link.

TB: Ok, so it's important to engage them if they're going to learn?

GH: Yes yes.

TB: Ok, **what indicators do you use to determine whether students are engaging in class activities?**

GH: I think that depends from student to student doesn't it. For some it would be umm their gaze, whether they're looking appropriately at what you want them to look at, or whether they're gazing towards you and sort of doing gaze shifting between you and what they want, and that sort of thing. Umm, for others it might be umm, you know, could be anything like their body language, how they're sitting, and you know whether they're, if they're sort of sitting with their legs facing away from you you know that's

because they're, that particular child is about to jump up and run off, and they don't want to centre themselves into what you're actually doing at that time, umm I I think it it's, I'd go for the main ones being I'd look at their eye contact, I'd look at their body language in terms of umm and how much they're shuffling about, or, but it, that varies, because I've got one student who will just, he'll run around the room, and I know he's looking at the thing I'm asking him to do, it's just that he needs to get up and run over there and come back before he can really focus on what he's doing, umm, but I think just proximity as well to thing that they're working with, so if they're they want to come, if they want to engage in the activity you're doing then they'll put themselves close by and you can see that they're listening, they might, for some students it might be if they're repeating words that you're saying or signs or using their PECS or it's just millions of things really.

TB: Ok, that's great. **What do you feel prevents some students from fully engaging in learning?**

GH: Umm, there, there are lots. Again that's I think there are lots and lots of things, and it depends, umm, for one student it could be what's going on in his head at the time, he's thinking about his mummy and he doesn't want to be in school, he wants to go and see if his mummy's in the family centre and that's all he can concentrate on that day, umm, and that stops him. For others it might be environmental, there could be a noise that is going on that's hurting their ears and they can't cope with, or the light's shining in from a particular angle at a window, or umm, the surface you give them to work on is distracting them or umm like in art we've got like an oil top tablecloth, and we've got one student who's that interested in that oil top tablecloth, he can't do what I've asked him to do because he just wants to touch this lovely shiny surface and lick it a bit and that sort of thing, umm. What else could it be? Oh it could be something physical like, umm, a lot of the students have problems with their bowels, and if they're about to go to the toilet, or they've just been to the toilet they might be in pain and that might stop them, umm, some of their autistic obsessive behaviours might stop them from engaging, umm, like self-stim behaviours, like if they're flicking their eyes and stuff that stops them from focussing on the thing. It's, it's difficult to know whether these things are stopping them from focussing, or whether they're not interested so they're doing that instead! And if the, really making the class activities, if they're not relevant and interesting, and at a suitable level, they're not gonna engage anyway so, umm, all of these factors I think come in to it.

TB: Yup, that's great. Ok, **from your experience, what elements of the learning environment have the greatest influence on students engagement, can you give any examples?**

GH: Umm, I think chairs are quite important, for some of ours, if you have a look in our classroom we've got umm, it looks a bit of a mess round our group table, cause we've got lots of different types of chairs.

TB: I've seen them. In the evenings they get put up onto the table, and when I drive past I always see it and think I wonder why they've all got different chairs..?

GH: That's a bit of a hodge-podge. And it's because, they all need something different from their chair. [redacted] needs a sturdy chair that he can't rock on. [redacted] needs a sturdy chair that's low down so that he's at a reasonable level to the table. He doesn't like to sit at a normal, where the table comes normally in a comfortable writing position, [redacted] doesn't like to sit like that, he likes the table to be quite high up, and he sort of puts his

chin on it, or rests on it, and that, I don't know why, but we've just found that that's one of the things that works for [redacted], if he can sit on a really wide base chair, and he can put his feet up, which you know I think a normal teacher would say "put your feet down" but for [redacted], if he can do that, he can concentrate on what you're doing, but if you ask him to sit on a regular chair, it's like that's the demand, and he can only cope with one demand at a time, so that's one of the reasons he's got that, and another one is umm, [redacted]'s got a little stool, because [redacted], if [redacted] sits in regular chair, or even the chair that doesn't rock that we've got for [redacted], [redacted] rocks backwards and forwards and then he can't concentrate on what he's doing, so [redacted]'s got a little stool, and everybody else has a regular chair, that's why there are so many different chairs!

TB: Right, that explains it then!

GH: Umm, what else have we got that's important? I think, for some students what's on the walls is very important, and for others not so, umm I think it's, I think it's fairly general for people with autism to be easily distracted by visuals, but some students cope with that better than others, umm, the, a class I had before I was able to put work up on the walls sometimes, but in here, it's just I just stick to the notice boards, and I try not to have it round the group table because there are students that are really easily distracted by that. Umm, one in particular, when I first came there was an alphabet freeze around the group table room, and that was all that he could cope with in that room, because there was an alphabet freeze and he had to go read it all, and whatever you put in front of him at the group table was just, he couldn't do that because there was something else that was going on. Umm, any sort of crinkly things or shiny things like paper out and stuff, that can be really distracting, ideally I'd like to have enough cupboards to shut everything away, so umm there isn't that out, because I've got two that are really distracted by paper and things, and that's err, for different reasons, one wants to write on it, one wants to rip it up, but err,

TB: Still both distracted by it.

GH: Absolutely yeah, and if it's there, or they know it's there and they can see it, it's a problem, but once you can, if you can lock things away in cupboards, and shut them away, even behind a curtain, for a lot of students who are lower ability, that's enough for them to not know that it's there any more, but for some, some they'll know it's there but because they can't see it, it's helpful in preventing that distraction. Umm, light. Windows. Umm, I've got one that looks out to the trees when it's sunny, one of the boys, and because the shape that makes, and the patterns and the light, that really really distracts him so I have to face him away from the window so he faces in to the room, because if he faces out of the room, he looks out and looks at all the pretty patterns and the leaves on the trees, umm, what else is a distraction here?

TB: Do you think it would be helpful to have, umm, you know the kind of glass you have in a bathroom, that you can't really see out of. So you think that would be helpful? Do you think it would let in enough light?

GH: Umm, the I think, I hate artificial light, personally, umm, and I know it's a massive problem for some of the students, having the fluorescent lights, umm, we've got all candescent lighting for [redacted] down here in his area down there, because he doesn't cope well with artificial lights, whether it gives him a migraine, or just, you know they say they can see it flicking and stuff, umm, but he finds that very distracting, so as long as it let in enough light so that you didn't have to have horrible fluorescent lights, I think

that would be a good idea. And you'll see in some of the classroom areas we've got frosting on the windows to do the same thing.

TB: Oh right, that's basically what I meant.

GH: But yeah, umm, you don't want to sort of completely, I don't like to completely shut it out, because umm, it, some of the things that go on in the day give them a clue as to what time it is, like when they see all the children coming up from their walk they know it's the start of the day, and when they see people pushing the red trolley down they know it's nearly time for lunch, and, a lot of the children in my class use that as a cue, so I don't umm, yeah but we've got quite a lot of that on to stop that because it is distracting.

TB: Yeah, Ok, anything else that you think influences engagement? Maybe the teaching pedagogy or the staff?

GH: Yeah I think absolutely, who's doing the teaching, who's umm, who's facilitating the learning is a very important thing, knowing the needs of the children, umm, knowing exactly what it is that they're going to need you to do to help them to learn, and that might be things that you need to do physically to adapt things, or it might be umm you know you might need to adapt the contents slightly, even you know as you're working with the child, umm I think that's got a massive massive impact. Umm if you have, if we have umm supply staff in, you notice the difference, absolutely.

TB: Yeah, Ok. Anything else? Which teaching pedagogies do you use? You use TEACCH and Intensive Interaction combined?

GH: Yeah, Yes. Err, I'm not sure how many other people do, but umm, it's just the needs of the children in here really, umm, one or two use TEACCH more predominantly, and a couple more use Intensive Interaction more predominantly, and others use TEACCH, with Intensive Interaction sort of thrown in really, sort of either in choice time or umm just when we think they need it, bit it's it varies really, we don't, some of the children here can't don't get on very well with TEACCH, there's only, there's 2 that don't get on brilliantly with TEACCH, it's just umm not necessarily the best thing for them, one because of his real strong demand avoidance, and he's been here long enough to work out that those little symbols, word cards, any sort of timetable is a demand, and, from you, and he's not gonna do that if you, but you have to kind of make it like a fun thing to do, if for him to be able to come and work, but he's quite high ability, umm and he's quite, he's able to speak and verbalise his wants and needs, and he's very very egocentric, in that he wants to control everything, and he doesn't like you controlling anything, so we have to negotiate the control there and he just he freaks when you try and give him anything that looks vaguely like it might be a schedule so. And he doesn't work in a workstation for that reason, but umm, it's ahh, we find that the two are absolutely usable in the same context, I don't think that you have to use one exclusively, but umm other people might argue against that, and I mean particularly with Intensive Interaction, some people might say that umm everything has got to be child led, but I think that umm, that's not the world, and whilst some things absolutely should be child led, we have to realise that we don't make every decision for ourselves, and we don't decide, I certainly don't get everything my own way, so I think that's err, that an important sort of part of TEACCH, to understand that we have to do some things that aren't for us, and aren't for our own purposes, because that's what the world is like, umm, and it you know, structuring and organising

their day helps them to be more relaxed some times, but it really varies from child to child which is why I use both approaches in here with different children, so.

TB: Ok, alright, moving on to the new school. **What are your aspirations for the design of classrooms in the new school?**

GH: I think umm I'd like them to be much more flexible, umm, where, in this building here, the umm, the walls are very structural, and it's hard. We've got one place where we've found we can knock the walls down, but every where else it's very rigid, and they're small rooms, this was not meant for a classroom, this was a house, and it's been extended from a house and we now use it as a classroom, and as such, there are some very small little rooms that used to be bedrooms and things, and just it the flow is not very good, and I think somewhere that's more flexible, cause yes we actually we do use TEACCH now, and we absolutely think TEACCH is great, but in 10 years time, this might be something that we look back and say god what were we doing with all those screens and stuff, and I'd hate to have built a school for TEACCH when that might not be what we're doing in 10 years time or 20 years time.

TB: Yeah. I don't think that any of the screens are going to be walls. Do you know what I mean? The classrooms will be classrooms, and then we're making furniture, so they're making workstations which are desks. Have you been in? Have you seen the furniture?

GH: I've seen [redacted]'s room.

TB: Right, yeah so you've seen the workstation, so like that but again flexible so you can take the screens off if you want to.

GH: That, that's exactly that I think would, we need something future proof. We need something that's going to, it's a horrible buzz word that they use in design isn't it, but we need something that's going to see us into the next generation of children we have here, because perhaps we won't have big classes, perhaps we'll need smaller spaces for individual children like [redacted], perhaps we'll need big classroom, you know we just we don't know what we'll need, so the more flexible the design can be the better, and somewhere, I'd love somewhere lighter and a bit more open, so that I don't have to use so much unnatural light, umm because I hate that, umm.

TB: Do you prefer the daylight bulbs? You call it candesence.

GH: Yes, yeah I call it that cause that's what the man said when he put them in.

TB: Oh ok, we got told they're daylight bulbs.

GH: Daylight bulbs then yeah. Yes I do I hate fluorescent lights and I don't think they're good for us or the kids, so, umm, I think something as well very sturdy as well, and rigid, in terms of the flooring and what's on the walls. Umm, we have to remember the needs of our students, and while, you know, it might not be very nice to talk about with the designers, our kids do things like throw poo, and we need very strong sturdy floors. We need things that are gonna get kicked, and are gonna have things thrown at them and they're not gonna break. We need flooring that's wipeable, or walls that are wipeable, we need bathrooms that are appropriate so the kids can't break the toilet systems and things, all those things are so important I think, and I think this is getting filtered through up to the designers.

TB: Yeah, robustness of design.

GH: Absolutely. Flexibility and robustness, so that children who need smaller spaces, umm that can be created for them within a bigger room, but once you've only got little spaces, it's, you can't do very much with that, so, yeah, that would be great.

TB: Ok. Anything else? You talked about storage before.

GH: Oh, yeah storage, yes, lots and lots. Because it's, children are, the children are so distracted by the various different things around them, and and it's hard to get the balance between independence and the distractibility because like sometimes you want a child to go and get their own resources from a cupboard, umm, in one class with one particular child, and then the next year in that classroom there might be children there who, you've got to lock everything away cause if you don't it's gonna end up everywhere all over the floor and you know not used appropriately and things like that, so they have to have something, like cupboards, that can either be locked or not, and things basically, just we need loads of storage cause you'll see there's just umm, particularly with TEACCH, and we've got the larger tasks and things, they take up loads of room, like construction things.

TB: Yeah they do don't they. Ok, anything else you'd like to see in the new classrooms?

GH: Umm, I think umm nice matching furniture. I know it sounds awful but just something that's nice to look at so that when you come and look round, perhaps even, I was saying about the hodge-podge of chairs, when you explain to people, they can understand that different people need different things, but like we were talking about those chairs that they were looking at that don't tip back, well if a child doesn't tip back on a chair, it's not, it doesn't matter that their chair does or doesn't tip back. But when, you know, you've got a chair that two children can use, one that does and one that doesn't and then they match and stuff, they're not, they're not gonna be all over the place. I think just when, because we, we do I think we do fantastically with our kids here, and we do some wonderful things with some very challenging children, umm but I think sometimes when people come and look round our school, it's not the nicest place to look round, in terms of buildings, our furniture is old, umm and you know we spend our money on staff, and I think that's quite obvious, but it would be lovely to have nice new things, and shiny things and things that match and because for the children as well, they you know, just look at a row of drawers there, they're all different colours and things cause they've been moved from sort of 37 different units, and they've all ended up there, and we probably have got lots of matching furniture in this school, it's just split up all over different classes.

TB: They're all in different rooms, yeah. Ok, **have you made any changes to your classroom environment in order to enhance engagement, can you give examples?**

GH: Yeah I think umm what's up on the walls. We, I try not to put things up on the walls in their learning rooms, and if I do, they're only on the notice boards that are up there anyway, so that have to have something on, umm I try and not have them being too distracting really, umm, so umm like I wouldn't put things with nice shiny tissue paper or things up because that would be something that they could that they might want to get and play with instead of learning. Umm I, I think we've done lots of things with the

furniture, to try and umm help the kids like, if I take you round to the group table afterwards, there's a bit for [redacted] that's very enclosed in the group table, there's a massive big wardrobe thing like cupboard, right in the middle of the classroom, which looks very odd, but it it's so that [redacted] feels safer at the table, so he's got his own little place, and he feels he can sit there now, and he couldn't before, because it was a big open space. Umm, screens we've got everywhere obviously, for various reasons, they've all got a reason, I could tell you them when we look at them, but, umm, can I think of anything else? Umm, I took quite a few of the screens out of here when I came in, because it was very very umm very tightly structured and put in and things, and umm I think sometimes it's kind of automatic to put a three-sided structure round a child who might not actually need a three-sided structure round them, umm, and I think we've got to remember what TEACCH says, that we use the minimum structure necessary, and I don't think we always do that, I think sometimes we go for this is a workstation, this is what you're having, cause that's what I've seen as a work station before basically, umm, [redacted] room has changed massively, he's got a safe space in there, did you umm see that?

TB: Briefly

GH: That's particularly for him because he self-injures on walls and things and floors, umm and he, he will need that to go with him. Not every, not every student needs that but I think a lot of them need a calm quiet place that they can kind of go away from the group.

TB: So do you think each classroom should have a sort of separate room that's a safe space - calm, safe.

GH: Umm, Ideally. I think some classes are probably not gonna need that for that purpose, but if there was that in every room, it could be different things for different people I think. Some classes absolutely would need a safe place in every room, umm, and for those that didn't, you know, perhaps it could be a cupboard or a sensory room, or just something different really for them.

TB: Just another space.

GH: Yes, but I think that would be good. Oh toilets. Umm, not having to go out of the classroom for toilets is really good. And also we don't have a shower in here, and umm one of the students needs to be washed for going to the toilet, when he goes to the toilet, so we have to take him back on to house every time he needs the toilet, so that's a problem.

TB: Oh really, that's a bit of a disruption to the school day.

GH: Absolutely, I mean we umm, generally we can get by with him just with wiping, but sometimes when he's really dirty he needs a shower, so and we don't have one. That would be good.

TB: I'm surprised because this was a house.

GH: It was a house, and there are showers in here, but we can't use them because they've not been used for so many years or something and then umm there's something that goes in the pipes after a certain amount of time so we're not allowed to

use them. Some sort of I don't know but yeah we're not allowed to use them apparently.

TB: Right, fine. Ok, fair enough. I think a missed a question. Ok, **what key words would you use to describe the physical environment of your current classroom?**

GH: Err, it's a bit of a hodge-podge in here really, umm, there's lots of very small rooms, inflexible in it's use of the space, umm, the very worst thing about this classroom is that we've got a very small, very tight narrow corridor that runs from one end to the other, and that's a big problem here, because you can either get very hurt by being stuck in that space, or umm if you need to do to restrain a child, you can't do that in that space, you have to move them which is not good at all, when they're very stressed, umm

TB: Yeah because you couldn't fit a two-person escort could you?

GH: Absolutely no you can't no, no it's really, it's quite bad really, scary sometimes when you have to move the kids down. Umm, it's quite dark as well in here, we have to have the lights on quite a lot, umm, and we have just normal light fittings like that umm and we've got one student that likes the lights on all the time, and one that likes them off, so they just keep clicking them, and I mean just because we're probably not gonna be in here for very long much longer, umm I think maybe the, it's probably not worth changing, but maybe the fish key lights would be better so they're adult operated with a key.

TB: Yeah, Ok.

GH: Oh some umm, of, this is not on this one, but back on, I was talking about we need quite rugged sort of surfaces like floors that are wipeable and things, but umm that creates quite a hard echoey sort of environment which is a bit of a problem really, cause some of the students are really distracted by that, so just err, throw that in.

TB: We're looking, yeah we're looking at, have you been on [redacted] and [redacted]?

GH: Yes I have, yes.

TB: We're looking at the moment, we're going to be trialling Flotex, which is sort of half-way, it's like a lino with a very small thin layer of furry-like carpet stuff, so it's more sound insulating, but it's also very robust and easy to clean.

GH: So is it like mopable or something?

TB: I don't know, I haven't actually touched it as such, but it works in the house, so I assume, I mean they must have accidents in there, so that's what we're looking at at the moment in terms of flooring, because that's a problem all over, in terms of echoing and you know, furniture gets wacked and it's kind of very noisy.

GH: Yeah absolutely, right, that sounds good. It's not great for sitting on as well really, you know, it's cold, this sort of vinyl, and we do, we sit on the floor a lot, whether we're doing Sherborne or Intensive Interaction, we're always on the floor, so it's not, and we have like cushions and things to sit on, but again this is the the students in this class umm are not fully toilet trained and things and we have lots of accidents and that's the

problem when you've got cushions and bean bags and stuff, to try and get them washed.

TB: Yeah, they get a bit dirty. You need waterproof covers that you can just take off them.

GH: Yeah.

TB: Ok, **what main teaching approaches do you use to support the students to engage in learning?**

GH: Umm, we use TEACCH and PECS and Intensive Interaction sort of and we use Sherborne also quite a lot, which is umm, another.

TB: How much do you use Sherborne?

GH: A fair bit really, cause we're on the research project here, so we have two lessons a week of Sherborne, and then we've all, since way before the project we've always done little bits here and there sort of as either a sort of behaviour control, when they get in stress we've done things like rocking and that sort of thing, or umm just for play and interaction and things we've used it, so umm, just a lot of that's student initiated, cause they, they've done it so much they'll come sit on the floor with you, and you just think oh come on we're doing a bit of that then, go on.

TB: That's really nice. Do you find that doing Sherborne helps them to engage either with you during that, or later with their work?

GH: Umm Yeah. And I, I think umm exercise as well has the same effect with that, we umm we're really lucky here to have the outdoor area, and umm we get to sort of go and have a run round outside and things and then after that they're able to focus more I think. If you think of an ordinary child, in an ordinary school, at this age they're moving all the time between classrooms to get to lessons and things, and they have that bit of exercise and that bit of time moving and things that they go outside to play, which our kids don't really, I mean we have the play area and things but we're a long way from the play area here so we we tend to use our garden, umm but I think all of those things are important because they, they're what they do with their bodies, helps with what they do elsewhere with their learning, so. And for a lot of children they, they need to physically experience things to be able to learn about them, so, cause that's just, that's just where they are.

TB: Yeah. So do you do quite a bit of kinaesthetic learning?

GH: Yeah absolutely, yes. Umm, we try and always have some aspect of kinaesthetic learning in the experience that we're doing that day, so, umm, a lot of them just can't really engage at a higher level that that when they're umm, sometimes when they're stressed, or sometimes that's just where they are, and they need to learn through doing.

TB: Ok, yeah that's great. I think we kind of covered it, but how **do you feel that these approaches influence the students' engagement?** Anything else you'd like to talk about, about that?

GH: Umm, Just really that, in relation to sort of the building, that umm it would be great to have the flexible space to be able to use those, all of those approaches, bigger spaces for using Intensive Interaction, spaces that we can make smaller for work stations should they be necessary and that sort of thing really.

TB: Ok, **are there any other teaching approaches or strategies or techniques which you use, or have used, or would like to use, to engage students in learning?**

GH: Umm, probably loads! Umm, we, I think it depends from student to student on what they need at that time, umm, and what they need to promote their learning, umm, and at the moment with my students, there's two that are as I said very heavily focused on Intensive Interaction, you can hear one in the background playing, and if you don't do that with him, if you don't, that particular student, if you don't interact with him on his level, he just won't interact with you, he'll ignore you, umm and he gets that sort of reciprocal relationship thing, he's learnt that through Intensive Interaction, that sometimes he chooses and sometimes I choose, and that's taught him to do that, and I I love, I'd like to carry on using that really with, umm I think most students benefit from some level of that really.

TB: Ok.

GH: I think, just perhaps, having the flexibility to use umm more technologically advanced different things, like, we'd love a whiteboard, we haven't got one here, and I think umm, we could make good use of one here. And also the umm, things like because of where we are here, we're not in the main school building, we're not allowed, we're not able to transition things from the sensory room to use in class, which, if we were sort of more on a level, and it was you know or we'd got a lift or something to move things about, we could do things like move the bubble tube into class, just for a session to use that or something, or some of the switch things or umm and I think to have some more sensory material stuff in class would be good, on loan or whatever.

TB: A sensory library?

GH: Yes, that would be great, because the things in the sensory room are available to use, umm in class, but we can't get them there, because we're down a hill and through some steps.

TB: Right, so it's too far.

GH: Yeah.

TB: Ok. And, anything else, **are there any other aspects of the classroom learning environment which you have found to influence student engagement?** Anything, the environment, students, the staff, the pedagogy, anything else?

GH: Umm, this sort of classroom has been a bit of a nightmare for managing the students really. Because umm, there are five members, no four members of staff and five students in here, and umm there are lots and lots of little rooms, and it's virtually impossible to know where they are and what they're doing all at the same time, umm, when there's an incident, you've got a long way to come down the corridor to try and find somebody to help that are more, that sort of thing. Umm, transitioning around

when there's an incident is very difficult because we're so packed in to this space, I mean it's, it's huge this classroom, but it's huge little rooms, lots and lots of little rooms.

TB: Bedroom spaces basically isn't it. It's funny though, because when I interviewed, I think it's [redacted], they're also a converted living accommodation, and they love having all the separate rooms.

GH: I do like having the separate rooms, in terms of I like having a room for [redacted] and a room for [redacted], but I don't like that they're so far apart, and they're down a really long narrow corridor, and that's a real problem.

TB: And would they cope just as well with their own area within a big classroom?

GH: Umm, I don't think they, those two I don't think would cope so well really, I think they both need, but what what [redacted] room is for, and [redacted] room is for, they're their time out spaces really for when they're really stressed.

TB: Oh they're not work rooms?

GH: No, so that I mean they would need something like that, and yeah I think, I think a more open plan classroom, with dividers within the room would be much easier to manage really as a class.

TB: Right, in terms of working: group work, independent work, 1:1.

GH: Absolutely, yeah, it would yes. And like [redacted] isn't like this classroom. And having the other rooms is great, but it's just the way this is set out it's a bit of a nightmare really.

TB: Yeah. I think they've got wider corridors, a wider corridor definitely, and they've got different kids as well.

GH: Ah, they're more able aren't they. And like [redacted] classroom and [redacted] classroom, they're all converted, but this, this I don't think works very well as a classroom particularly, umm it's just the space as it is really, but umm I can always put a positive spin on it for when I'm needed to, but umm the true aspect is that it's very difficult to work down here really.

APPENDIX 6

INITIAL, FOCUSSED & THEORETICAL CODING

GERUNDS (Organised alphabetically by focused code, within theoretical code groups)

PHYSICAL ENVIRONMENT

INITIAL CODE	RESPONDENTS	TOTAL
ACOUSTICS		
Noise affecting students	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T13, T15, R1, R2, R4, R5, R6, R7, R12, R13, R14, R15, R17, R20, R23, R24, R25, R26, FI1	30
Classrooms being echoey (caused by high ceilings)	T10, T11, T12, T13	4
Classrooms being noisy	T2, T9, T10	3
Classrooms needing to be quiet	T9, T11, R7, R8, R18, R22	6
ARTIFICIAL LIGHTING		
Artificial lighting affecting students	T1, T2, T3, T4, T5, T6, T8, T9, T10, T11, T13, T15, R1, R2, R12, R13, R14, R15, R17, R20, R25, R27, FI2, FI4	24
Strip lighting being 'ok'	T8	
Lighting needing to be dimmable	T11, T15, FI2	3
Lighting needing to provide a natural and 'warm' colour rendering	T6, T13	2
Light switches needing to be staff operable only	T5, T10, T11	3
Reflection of light affecting students	T4, T5, T9	3
Providing coloured lights	R3, FI2	2
BLINDS		
Blinds distracting students / being pulled down	T7, T9, T11	3
Blinds being needed to block sunlight	T7, T9, T10, T11, T13, R2	6
Black-out blinds being best	T11	1
Blinds being needed to block distracting views	T13, FI1	2

INITIAL CODE	RESPONDENTS	TOTAL
CHILL-OUT ROOM		
Students needing a quiet space to calm down when anxious	T1, T2, T4, T5, T6, T7, T8, T9, T10, T13, T15, R1, R3, R4, R5, R7, R8, R9, R10, R12, R16, R17, R18, R25, FI1, FI2, FI3, FI4	28
Chill-out room needing to be padded	T9, R3, FI2	3
Chill-out room having a window to observe students	FI2	1
CLASSROOM HYGIENE		
Classrooms being hazardous to health	T8	
CLASSROOM SIZE		
Needing large classrooms	T1, T2, T4, T5, T6, T7, T9, T10, T11, T13, T14, T15, R1, R3, R4, R5, R6, R7, R8, R9, R10, R13, R14, R15, R17, R18, R19, R20, R21, R23, R24, R25, R26, FI1, FI3, FI4	36
Classrooms being too small	T3, T5, T9, T11, T13, R3, R6, R7, R8, R20	10
Students struggling with very large or small spaces	T5, T12, R5, R23	4
Low ceilings being oppressive	T2, T4, T13	3
CLASSROOM STRUCTURE		
2 rooms being better than 1	T1, T2, T3, T4, T6, T7, T8, T9, T10, T11, T12, T13, T15, R1, FI1, FI2, R3, R5, R6, R7, R8, R9, R17, R20, FI3, FI4	26
Staffing issues arising from having 2 classrooms a distance from each other	T5, T13, FI2	3
CORRIDORS		
Narrow corridors being a health and safety risk	T5, R25	2

INITIAL CODE	RESPONDENTS	TOTAL
COMPUTER DESK		
Needing a computer in the classroom	T1, T15, R3, R5, R14, R17	6
Students obsessing about computers	T2 FI2	2
Computer needing to be screened off / protected	T3, T7, FI2	3
EXERCISE		
Exercise helping students engage and calm	T5, R16, R19, FI2	4
Having easily accessible outdoor areas for outdoor exercise	T3, T4, T8, T15, R4, R5, R17, R25, FI1, FI2	10
Having equipment for indoor exercise	T4, T11, T12, T13, FI2	5
Having equipment for outdoor exercise	T13	1
Access to outdoor areas being weather-dependent / requiring staff	FI2, T4	2
Having a swimming pool	T8	
FURNITURE & FURNISHINGS		
Furniture being appropriate	R1, R3, R6, R10, R21	5
Furniture being flexible	T7, T8, T12, T14, T15, R1, R2, R5	8
Furniture being uniform	T5, T7, T8, T9, T15, R7, R9	7
Furniture being robust and sturdy	T5, T6, T7, T8, T11, T13, R1, R3	8
Needing non-reflective surfaces	T2, T4, T5, T11, R2, FI4	6
Using the right colours	T2, T8, T13, R1, R2, R4, R5, R8, R9, R11, R22, R23, R25, FI4	14
Using plain / solid colour finishes	T15	1
Needing soft furnishings to absorb noise	R1	1
Wanting rounded furniture	R8	1
Bespoke furniture being an improvement	TF1, TF2, TF3, TF4, TF5, TF7, TF8, TF9	8

INITIAL CODE	RESPONDENTS	TOTAL
FURNISHING: FLOORING		
Flooring causing echoing / other environmental noise / needing to be sound-absorbent	T3, T5, T9, T10, T11, T13, R5, FI1, FI4	9
Flooring needing to be cleanable	T1, T2, T3, T5, T7, T10, T11, FI1	8
Flooring needing to be durable	T1, T2, T5, T6	4
Flooring needing to be suitable to sit on	T5, T6, R5, FI1	4
Having an area of flooring suitable for sliding / wet play	R1, FI1	2
Not using carpet	R10	1
FURNISHING: UPHOLSTERY		
Upholstery needing to be waterproof / washable / easily cleaned	T5, T7	2
Upholstery needing to be robust	T11	1
FURNITURE: GROUP TABLE		
Tables needing to be height adjustable	T13, R5	2
Needing adequate space for staff	R3, R4, R21, R25	4
Tables needing to be more flexible	TF1, TF2, TF8	
FURNITURE: WORKSTATIONS		
Workstations supporting students to focus	T6, R11, R12, R15, R28	5
Desks needing to be wider to accommodate larger tasks	T11, TF4, TF5, TF6, TF7, TF8, TF9, TF10, R6	9
Workstations needing to be (more) flexible	T5, T12, T14, T15, R20, TF1, TF7, TF8, TF10	9
Workstations having suitable screening	T7, T13	2
Workstations needing to be sound-absorbent	T11, FI1	2
Screens needing to be more robust	T11, TF2, TF4, TF8, TF10	5
Worksystems needing to be available in different sizes to accommodate different sized tasks	T11, TF3, TF4, TF5, TF6, TF7, TF8	7

INITIAL CODE	RESPONDENTS	TOTAL
Screens needing to be adjustable in height / removable / addable	T11, TF5, TF7, TF8, TF10	4
Students being able to decorate their own independent work areas	T1	
HEATING		
Classrooms having poor heating	T6, T8, T9	3
Teachers needing to have control over heating	T9, T10, T11	3
KITCHEN FACILITIES		
Water needing to be under control of staff	T3, T11, T13	3
Classrooms needing access to water / sinks	T9, T13	2
Needing kitchen facilities to teach life skills	T3, T9, R5	3
MATT LAMINATE		
Using / wanting to use matt laminate	T2, T11, R5, FI1	4
NATURAL LIGHTING		
Classrooms needing large windows/ natural light	T1, T2, T5, T6, T7, T9, T15, R1, R18, R19, R25, FI2	12
Sunlight affecting students	T4, T5, T7, T10, T11, T13, R2	7
Reflection of light affecting students	T4, T5, T9	3
OTHER CONSIDERATIONS		
Each classroom being unique	T8	1
Having an area of comfy chairs for circle time	T1	1
Classrooms needing to be flexible	T3, T5, T14, R2, R17, R20	6
Needing an observation window for visitors to observe from outside	T9, T11, T14	3

INITIAL CODE	RESPONDENTS	TOTAL
ROCKING CHAIRS		
Students enjoying rocking and it being important for calming	T5, T6, T11, T15	4
Rocking chairs needing to be robust	T11	1
ROOM TEMPERATURE		
Room temperature rising due to sun shining in	T4, T9, T11, T15	4
Classrooms being too hot / cold	T1, T2, T4, T9, T10, T11, T13, T15, R5, R11	10
Room temperature affecting students	T1, T2, T10, T11, T13, T15, R5, R9, R11, R13, R15, R17, R20, R21, R26	15
SCREENS		
Using screens for visual structure to help students focus	T2, T5, T8, R2, T13, R12, R17, R19, R25	9
Screens needing to be sound-absorbent	T11	1
SAFETY & SECURITY		
Making the environment safe	T10, T13, R3, R5, R19, R20	6
SENSORY EQUIPMENT		
Providing sensory equipment for self-regulation	T5, T6, T11, T12, R3, R22, FI1, FI2	8
Having rooms for sensory activities	T7, T13, R1, R5, R6, R7, R8, R16	8
Students enjoying swinging and it being important for calming	T11, T15, FI2	2
Having an indoor swing	FI2	1
STORAGE		
Needing lots of storage	T1, T5, T6, T13, R6, R7, R8, R12, R18	9
TEACCH resources requiring lots of storage	T5, T11, R12	3
Clutter distracting students / Storage needing to be out of sight	T3, T5, T6, T7, R7, R8, R10, R12, R16, R17, R18, R20, R23, R26, FI1, FI4	16
Having choice cupboards with see-through doors	R2, FI4	2

INITIAL CODE	RESPONDENTS	TOTAL
TOILET FACILITIES		
Needing suitable toilet facilities	R6, R7, R8, R9	4
Toilet areas being adequate size	T7, T8, T11,	3
Having an adequate number of toilets	T3, T10, T11, R3	4
Needing a toilet accessible from the classroom	T2, T5, T9, T11, R3, R5	6
Toilets needing to be robust	T5, T11	2
Water needing to be under control of staff	T3, T11, T13	3
Needing a shower	T5	1
Needing bathroom facilities to teach life skills	T3, R5	2
VENTILATION		
Windows needing to open for ventilation	T4, T6, T9, T12, T13	5
Classrooms needing ventilation	T2, T8, T10, T11, T15, R5, R21	7
Students posting things through opening windows	T11	1
Fans only circulating hot air	T9	1
Classrooms needing air conditioning units	T1, T9, R11	3
Portable air conditioning units being noisy	T1	1
VISUAL CLASSROOM ENVIRONMENT		
Classrooms having physical/visual structure to support students	T1, T2, T6, T9, T10, T11, T12, T13, T15, R1, R4, R12, R14, R17, R19	15
Making classrooms a distraction-free, low arousal environment	T1, T2, T5, T7, T8, T9, T10, T11, T13, T15, R1, R5, R6, R7, R8, R10, R11, R12, R13, R17, R18, R20, R22, R23, R24, R25, FI1	27
Students struggling to understand where their bodies are in space (curvilinear design)	T13	1

INITIAL CODE	RESPONDENTS	TOTAL
WINDOW VIEWS		
Students being distracted by window views	T3, T5, T7, T9, T10, T13	6
Frosting on windows to block distracting views	T5	1
Students using window views to orient	T5	1
High-level windows preventing distraction	T7	1
WORK CHAIRS		
Students rocking on work chairs	T1, T5, T7, T8, T11, T12, T13	7
Chairs needing to promote good posture/ comfort	T13, R5	2
SEPARATE 6th FORM BLOCK		
Having a 6th-form common room	T3	

TEACHING APPROACH

INITIAL CODE	RESPONDENTS	TOTAL
INTERACTIVE WHITEBOARD		
Interactive whiteboard being beneficial	T1, T3, T4, T7, T9, T11, R1, R15, FI3	9
Wanting an interactive whiteboard in the new school	T1, T5, T9, T15, R4, R17	6
Using the IWB	R9, R10, R10, R13, R14	5
Sunlight affecting interactive whiteboard	T11	1
Needing more time / training to use IWB effectively	T7, T11, R13, R14, R15	5
Interactive whiteboard being robust	T11	1
Needing to be aware if students do not respond to the IWB	T9, FI3	2

INITIAL CODE	RESPONDENTS	TOTAL
INTENSIVE INTERACTION		
Using / wanting to use intensive interaction / interactive approaches	T2, T4, T5, T6, T7, T8, T10, T11, T13, R1, R5, R6, R7, R8, R17, R18, R19, R20, R26, FI1, FI3	21
Intensive interaction encouraging communication and/or engagement	T5, T6, T8, T13, R6, R7, R8, R18, R20, FI1	10
Intensive interaction calming	T11, R5	2
Providing a responsive environment	T6, T7, T8, R7, R26	5

FOCUSED CODES FOR OTHER TEACHING APPROACH / PEOPLE ISSUES RAISED – (organized alphabetically within theoretical codes)

FOCUSED CODE	RESPONDENT	TOTAL
ENGAGEMENT		
Engagement essential for learning	T1, T2, T4, T5, T6, T7, T8, T9, T11, T13, T14, T15, R1, R2, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R19, R20, R22, R23, R24, R27, R28	34
Levels of engagement	T8	
Indicators of engagement	T1, T3, T4, T5, T6, T7, T8, T9, T10, T11, T14, T15, R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R25, R26, R27, R28	40
Indicators of disengagement	T2, T9, T15	3

INITIAL CODE	RESPONDENTS	TOTAL
STAFF-RELATED ISSUES		
Staff being willing to get down to the students' level, follow students' lead and give students a degree of control over their learning	T2, T5, T6, T14, T15, R1, R7, R18, R26, FI1, FI4	11
Importance of staff	T1, T2, T3, T8, T9, T10, R2, T14, FI2	9
Number and consistency of staff	T4, T5, T8, T9, T10, T13, R3, R4, R11, R15, R22, R24, R27, R28	14
staff attitude & approach	T1, T4, T5, T6, T9, T10, T12, T13, T14, T15, R1, R2, R4, R11, R14, R16, R17, R18, R21, R24, R26, R27, FI2, FI3	24
staff knowledge of autism / individual students / teaching approaches	T3, T5, T7, T8, T9, T10, T11, T12, T13, T14, R1, R4, R18, R25, R27, FI2, FI3	17
STUDENT-RELATED ISSUES		
Peer groupings	T2, T3, T4, T7, T9, T10, T12, T15, R1, R4, R6, R7, R14, R20, R23, FI2, FI3	17
Internal student factors	T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T15, R2, R4, R5, R11, R12, R13, R15, R16, R17, R18, R20, R21, R22, R24, R27, R28	30
More able students being flexible	T3	
Students having choice / input in to new school	STUDENT VOICE / METHODOLOGY (R20)	
Number of students	T2, T3, T4, T8, T13, R4, R5, R6, R11, R15, R22, R23, R28	13

INITIAL CODE	RESPONDENTS	TOTAL
TEACHING APPROACH		
Appropriateness of teaching approach and resources	T1, T4, T5, T6, T7, T8, T11, T12, T14, R1, R2, R3, R4, R6, R13, R14, R15, R16, R18, R20, R23, R26, FI1, FI4	24
Appropriateness of the curriculum	T3, T4, T10, R1	4
Benefits of the TEACCH Approach	T2, T4, T5, T7, T8, T9, T11, T12, T15, R1, R3, R6, R8, R12, R18, R27, R28, FI2	18
Consistency of approach	T1, T8, T13, R5, R12, R20, R21, R24, FI2	9
Drawback of providing too much structure	T10, T14, T15	3
Making learning meaningful and motivating	T2, T3, T5, T6, T7, T8, T9, T11, T12, T14, T15, R1, R2, R4, R12, R13, R14, R15, R16, R18, FI1, FI3	22
Making tasks short / manageable / achievable	T7, T11, T15, R4, R8	5
Personalising teaching	T2, T3, T4, T5, T7, T8, T9, T10, T11, T12, T14, T15, R4, R5, R6, R7, R16, FI1	19
Recognising and targeting students' differing learning styles and preferences	T1, T5, T7, T8, T9, T10, T11, T13, T14, T15, R1, R5, R6, R9, R10, R14, FI1 R15, R16, R21, R26, FI3	22
TEACCH limiting opportunities for social interaction	T6, T7, T8, T9, FI4	5
Using a variety of approaches	T1, T2, T3, T5, T7, T8, T10, T11, T12, T13, T14, R1, R3, R4, R5, R6, R7, R8, R9, R10, R11, R16, R17, R26, R28, FI1	26
Working with parents	METHODOLOGY (R25)	

APPENDIX 7

SAMPLE SECTION OF OBSERVATION SCHEDULE
COLLATED FROM CLASSROOM OBSERVATION FIELD NOTES

Date	Day	Time	Activity	Obs-Code	Observation
29/01/2007	Monday	PM	Circle Time	Acoustics	Banging on group table
29/01/2007	Monday	PM	Circle Time	Table - Glossy	Writing on table with saliva
30/01/2007	Tuesday	PM	Cookery	Chair Rocking	Leaning back on chair
30/01/2007	Tuesday	PM	Independent work	Chair Rocking	Leaning back on chair
30/01/2007	Tuesday	PM	Circle Time	Table - Glossy	Regurgitating, playing with it on table
31/01/2007	Wednesday	PM	Circle Time	Chair Rocking	Leaning back on chair
31/01/2007	Wednesday	PM	Circle Time	Chair Rocking	Rocking and bouncing on chair back
31/01/2007	Wednesday	PM	Circle Time	Chair Rocking	Leaning back on chair
31/01/2007	Wednesday	PM	Circle Time	Chair Rocking	Rocking and bouncing on chair back
31/01/2007	Wednesday	PM	Circle Time	Laminate - Glossy	Struggling to see dominoes due to glare from shiny laminate
31/01/2007	Wednesday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
31/01/2007	Wednesday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
31/01/2007	Wednesday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
31/01/2007	Wednesday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
31/01/2007	Wednesday	PM	Circle Time	Table - Glossy	Drawing on table with saliva
31/01/2007	Wednesday	PM	Circle Time	Table - Glossy	Drawing on table with saliva
01/02/2007	Thursday	PM	Circle Time	Acoustics	Banging on group table
01/02/2007	Thursday	PM	Circle Time	Chair Rocking	Swinging and bouncing on chair
01/02/2007	Thursday	AM	Circle Time	Table - Glossy	Writing on table with saliva
02/02/2007	Friday	AM	Circle Time	Acoustics	Banging on group table
02/02/2007	Friday	AM	Circle Time	Chair Rocking	Leaning back on chair
02/02/2007	Friday	AM	Circle Time	Laminate - Glossy	Struggling to see dominoes due to glare from shiny laminate
02/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
02/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
02/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights

Date	Day	Time	Activity	Obs-Code	Observation
02/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
05/02/2007	Monday	AM	Circle Time	Chair Rocking	Leaning back on chair
05/02/2007	Monday	AM	Circle Time	Chair Rocking	Leaning back on chair
05/02/2007	Monday	AM	Circle Time	Chair Rocking	Leaning back on chair
05/02/2007	Monday	PM	Circle Time	Chair Rocking	Rocking on chair
05/02/2007	Monday	PM	Circle Time	Chair Rocking	Leaning back on chair
05/02/2007	Monday	PM	Circle Time	Chair Rocking	Rocking on chair
05/02/2007	Monday	PM	Circle Time	Chair Rocking	Rocking on chair
05/02/2007	Monday	PM	Circle Time	Chair Rocking	Rocking on chair
05/02/2007	Monday	AM	Circle Time	Table - Glossy	Drawing on table with saliva
06/02/2007	Tuesday	AM	Independent work	Chair Rocking	Leant back on chair and fell twice
07/02/2007	Wednesday	AM	Circle Time	Chair Rocking	Leaning back on chair
08/02/2007	Thursday	PM	Circle Time	Laminate - Glossy	Struggling to see dominoes due to glare from shiny laminate
08/02/2007	Thursday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
08/02/2007	Thursday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
08/02/2007	Thursday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
08/02/2007	Thursday	PM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
08/02/2007	Thursday	PM	Circle Time	Table - Glossy	Regurgitating, playing with it on table
19/02/2007	Monday	PM	Circle Time	Chair Rocking	Swinging on chair
19/02/2007	Monday	AM	Circle Time	Laminate - Glossy	Struggling to see dominoes due to glare from shiny laminate
19/02/2007	Monday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
19/02/2007	Monday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
19/02/2007	Monday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
19/02/2007	Monday	AM	Circle Time	Lighting - Old	Struggling to see dominoes due to reflection from lights
19/02/2007	Monday	AM	Circle Time	Table - Glossy	Spitting on table and rubbing
19/02/2007	Monday	AM	Circle Time	Table - Glossy	Spitting on table and rubbing
19/02/2007	Monday	PM	Circle Time	Table - Glossy	Writing on table with saliva
20/02/2007	Tuesday	PM	Circle Time	Laminate - Matt	All pupils focused on task
21/02/2007	Wednesday	AM	Circle Time	Laminate - Matt	All pupils focused on literacy task
23/02/2007	Friday	AM	Circle Time	Chair Rocking	Swinging on chair
23/02/2007	Friday	AM	Circle Time	Laminate - Glossy	Unable to focus on book until placed directly in front of them

Date	Day	Time	Activity	Obs-Code	Observation
23/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
23/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
23/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
23/02/2007	Friday	AM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
23/02/2007	Friday	AM	Circle Time	Table - Glossy	Drawing on table with saliva
26/02/2007	Monday	AM	Choice	Chair Fabric 1	Picking fabric off chairs
27/02/2007	Tuesday	PM	Choice	Chair Fabric 1	Picking fabric off chairs
01/03/2007	Thursday	PM	Choice	Chair Fabric 1	Picking fabric off chairs
01/03/2007	Thursday	AM	Circle Time	Laminate - Matt	All pupils focused during circle time and PSHE
01/03/2007	Thursday	PM	Circle Time	Laminate - Matt	All pupils able to focus on book from across the table
01/03/2007	Thursday	AM	Choice	Table - Glossy	Spitting on table and rubbing
05/03/2007	Monday	PM	Circle Time	Acoustics	Banging on group table
05/03/2007	Monday	AM	Choice	Chair Fabric 1	Picking fabric off chairs
05/03/2007	Monday	AM	Choice	Chair Fabric 1	Picking fabric off chairs
05/03/2007	Monday	AM	Circle Time	Chair Rocking	Leaning back on chair
05/03/2007	Monday	PM	Circle Time	Laminate - Glossy	Unable to focus on book until placed directly in front of them
05/03/2007	Monday	AM	Circle Time	Laminate - Matt	All pupils able to focus on dominoes across the table
05/03/2007	Monday	PM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
05/03/2007	Monday	PM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
05/03/2007	Monday	PM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
05/03/2007	Monday	PM	Circle Time	Lighting - Old	Struggling to see book due to reflection from lights
05/03/2007	Monday	AM	Circle Time	Table - Glossy	Writing on table with saliva
06/03/2007	Tuesday	AM	Choice	Chair Fabric 1	Picking fabric off chairs

APPENDIX 8

PRACTITIONERS' COMMENTS ORGANISED BY INITIAL AND FOCUSED CODING WITHIN THEORETICAL CODES

GERUNDS organised alphabetically by focused code, within theoretical code groups

PHYSICAL ENIVRONMENT

ACOUSTICS
Noise affecting students
Noise has a tremendous amount of impact … a lot of our children are so noise sensitive, and it's not just the noise within their classroom, it's the noise reverberating across joists, through windows, whatever. (FI1) *Noise levels … – reduction in noise levels i.e. echoing corridors, slamming doors etc (*R4) *Some of them get distracted by external stimuli, things like noises, I mean some of them, some of the autistic students especially, are very sensitive to different noises … there are lots of noises going on in the classroom that some of the students are very definitely tuned into, the heaters, the lights and that sort of thing.* (T1)
Classrooms being echoey (caused by high ceilings)
Also the ceiling, as I'm speaking now, it echoes, it's not clear, it's like a bell shape (T10) *Echoing - anybody who screams, it just echoes, and just drives other kids mad (T13)* *I have been told that they're going to lower the ceiling because it is a very high ceiling and so it echoes (T12)*
Classrooms needing to be quiet
Students in this room share a teaching area, and the students in that room have got a teaching area where they go to and learn in a 1:1 situation … it's as quiet and distraction free as possible. (T11) *It's nice and quiet, you haven't got people having to walk through to get to another room or anything like that* (T9) *"I do think that when we're doing 1:1 that maybe people should use corridors or the calm area or the extra room if they've got it, and put a table in there and take it out of the actual classroom environment because I do feel that the student's more focused in a very quiet area and is able to concentrate better. Obviously with autism it's difficult for them to concentrate at a 1:1 table when you've got 3 or 4 others in the class that are doing goodness knows what, and raising noise levels." (T12)*
ARTIFICIAL LIGHTING
Artificial lighting affecting students
I think student friendly lighting as well, so lighting that doesn't buzz, doesn't pulsate, that's important (FI4) *The lighting in here I wanted changed when I moved in here, I wanted the daylight bulbs, but … it's too expensive. I do think that strip lights are just horrific. (T6)* *I hate artificial light, personally, and I know it's a massive problem for some of the students,*

having the fluorescent lights, we've got all candescent lighting for X down here in his area down there, because he doesn't cope well with artificial lights, whether it gives him a migraine, or just, you know they say they can see it flicking and stuff, but he finds that very distracting. (T5)
Lighting needing to be dimmable
I think to be able to alter the lighting some times in a so that it wasn't so bright at times and then it was brighter at others would be useful as well, because you've either got lights on, or off, and that's it, there's no in between. (FI2) *If I have one child in a classroom who's sensitive to light, how can I moderate it for him? You know, you can't can you. There's a fixed level of lighting isn't there that you've got when you put the light on.* (T11) *Maybe with a dimmer switch on would be of benefit, because then you've got the flexibility to have it mid level* (T15)
Lighting needing to provide a natural and 'warm' colour rendering
Particularly in the winter because it's such a dark room anyway, you can see the kids squinting sometimes in the winter, and I think it's cause it's such an artificial light, it's just no good for them, you know, we could do with proper decent lighting. (T6) *I find it a particularly depressing light up there, it's very cold, and it's quite dim* (T13)
Light switches needing to be staff operable only
We have just normal light fittings like that and we've got one student that likes the lights on all the time, and one that likes them off, so they just keep clicking them, and I mean just because we're probably not gonna be in here for very long much longer, it's probably not worth changing, but maybe the fish key lights would be better so they're adult operated with a key. (T5) *I want it to take account of … the control of the heating aspect, and also the control of the lighting* (T10) *We do get students who mess about with the lights … they like to have the switch up or down or something, so that can be one of their behaviours is turning switches off* (T11)
Reflection of light affecting students
What would prevent students [from engaging] … excess light, or reflection of light (T4) *…or the light's shining in from a particular angle at a window* (T5) *It's the same lights that they've got in like the admin department, and the ICT department, and I think it is special lighting … it doesn't give off reflections and they don't buzz, because usually you find with fluorescent lighting you've got that bzzzzzzzzz, and they haven't got that. So they've been great.* (T9)
Providing coloured lights
With one of the particular boys I worked with we found if we put green gels in the lights where he was in the classroom he was a lot calmer. I suppose it links a bit in with the colour impact project. And someone had done some work and found that he had been more responsive in those colours, so the areas in the classroom where he spent most of his time would have green lighting. (FI2) *Lighting which can be adapted with colour gel or something to suit students' varying needs*

(R3)
BLINDS
Blinds distracting students / being pulled down
Blinds and things sometimes you have a problem with [students] playing with them and rattling them and shaking them and pulling them up and down, and that's a big distraction (T7) *Blinds that fit and aren't sort of hanging you know ripped from the walls* (T9) *And the blinds, we've had to tie them up cause they've just ripped them down or put them round their necks. So the cords, the cords have to be tied up out of their way, so that we have to climb on a chair or a table to pull it down, the blind down, to prevent the children, and bear in mind some of the children some of the students are taller than us!* (T11)
Blinds being needed to block sunlight
There's blinds up here and it's not directly facing it [the sun] (T9) *Some students could cope with the light coming in, and liked to occasionally look outside, and others would look outside all the time, so you'd have to still have the blinds shut.* (T13) *Use of blinds to reduce direct sunlight* (R2)
Black-out blinds being best
They're not black-out blinds, they don't cause enough [protection] (T11)
Blinds being needed to block distracting views
Depending on whom I've got in here I might block the room out completely, for one young gentleman this morning, the blind goes down, the table is in that corner, and everything is blocked out as much as possible so that he has got as empty an area, distraction-free area as possible, everything comes out of there, and he just has a schedule to follow and a worksystem to follow through. (FI1) *Some students could cope with the light coming in, and liked to occasionally look outside, and others would look outside all the time, so you'd have to still have the blinds shut* (T13).
CHILL-OUT ROOM
Students needing a quiet space to calm down when anxious
I would like space for students to have their own space. To have I don't know what you want to call it, chill-out space, opt-out space, so that when things do become too much for them, then they've got somewhere safe and secure to go that's readily available, so that that reduces the likelihood that they're gonna kick off for want of a better phrase. They may well need some encouragement in the early days to use it effectively, but it's there, it's available, and I think that's hugely important. (FI4) *Students who need a separate space to calm down or relax when distressed and upset* (R3) *When I worked in the portacabins, there's 3 classrooms in the portacabin, and the rocket room, the rocket room's really useful, because I had a pupil who did need to go into there* (T10)
Chill-out room needing to be padded
One of our students can calm himself effectively if he has a quiet room with padding on the

floors and walls to throw himself off to get the deep pressure he requires (R3) *The soft play area is really good for some kids, to go in and to throw themselves around, because it's padded, so they can really bash themselves about, and that calms them down like. One of the boys I worked with last year, it was recommended by the psychologist that he had like a little padded room, because on house, to calm himself down, he throws his mattress off his bed, stands on his bed and jumps on to the mattress, on to his knees or on to his back or because it calms him down, so he's learnt his own coping strategy, so he needs somewhere in school where he can go and do the same thing you know.* (FI2) *We've got a chill out space, it's just round there in the corner, it's all screened off, that's our calm area, and it's got a padded, we've put a matt down, and lots of bean bags, and the boys will go and plonk themselves in. If there's an incident, because we haven't got a room we can shut the door, we do use that, and we'll pull the screen across just for them to calm down, cause they can't hurt themselves, cause it's all sort of padded, so oh yeah we'd be lost without that, we'd be lost without our calming area* (T9)
Chill-out room having a window to observe students
You need really like a couple of rooms off the classroom which you can just use for calming rooms, that have got perhaps even like a door in between the two areas, so that you can just be in there with a window, and people can still see what is going on, so the kids are safe and stuff and see that you're ok, that you're calming the child, but there's that door to stop so much of the noise getting transferred into the other room. (FI2)
CLASSROOM SIZE
Needing large classrooms
I do think there needs to be a lot of space, I'm a great believer in that … I do think you need space (FI3) *I think you want the option of having a bigish space, I think that there are times when it's important that you have the whole group together* (FI4) *And a lot of space being able to move around in. So that works quite well* (T14)
Classrooms being too small
It's very rare these days that I have huge groups mainly because the rooms are too small, so that means everybody's very close to each other, physically close to each other being hands, feet especially under the tables is always a good one to get people wound up (T3) *The last class was much narrower, and you know, you had to sort of pull your chairs into get round the table … it was small* (T9) *[My current classroom is] echoey, hot, … and I would say it's small* (T11)
Students struggling with very large or small spaces
Space – either too much or too little. Proximity … space for active / large students (R5) *There's a bit for X that's very enclosed in the group table, there's a massive big wardrobe thing like cupboard, right in the middle of the classroom, which looks very odd, but it it's so that X feels safer at the table, so he's got his own little place, and he feels he can sit there now, and he couldn't before, because it was a big open space* (T5) *Some students would find it difficult being in an open space.* (T13)
Low ceilings being oppressive

It's a very low ceiling in here as well (T2) *these feel a bit enclosed. I don't think the ceiling's that low, but it just feels oppressive* (T4) *I feel like you need to have space above, and not an oppressive low ceiling, I don't think that's a good thing* (T13)
CLASSROOM STRUCTURE
2 rooms being better than 1
The learning environment for these students in here is very visual, and its got to be clear, there's got to be a clear definition of what that room's for and what this room's for … There's factors like we haven't got 2 rooms, we used to have a little door that we could lock to make a clear distinction between choice and work, and we haven't got that now, we've only got a screen. (T9) *I think where the work is in one room and the choice is in the other, it's a good idea. And in that situation I think the students then associate with going to the one room for work, and going to the other room for play or choice or whatever.* (T13) *Having separate rooms so that you've kind of like, you can have a quiet session going on in one room, and then have a noisy session in another room, and not, that's not going to interfere with the learning of the students* (FI3)
Staffing issues arising from having 2 classrooms a distance from each other
The only time that it was a problem, was when one of the students was having a particularly hard time, and there was three staff in one side and two staff in the other, but if something happened to that one child it would take 3 members of staff to look after that child and there was not always a way of getting attention from the other room for someone to come and get the other kids, and take them across somewhere safe. So there'd be like 4 kids in the room, 1 kicking off and 3 just like petrified, crying, kicking off themselves. So perhaps 2 classrooms but like a small corridor in between so that you could communicate … because there were 3 doors, so even if you did hear someone you had to get through 3 locked doors before you can get through (FI2) *Having two separate rooms where it's separate classrooms, is harder to cope with. I have been in that situation myself, and you always have to split staff, so that one room might be understaffed, because of the students in a particular, in the other room or side of your classroom, so it's not necessarily a good thing.* (T13) *I don't like that the rooms are so far apart. I think a more open plan classroom with dividers within the room would be much easier to manage as a class.* (T5)
CORRIDORS
Narrow corridors being a health and safety risk
The very worst thing about this classroom is that we've got a very small, very tight narrow corridor that runs from one end to the other, and that's a big problem here, because you can either get very hurt by being stuck in that space, or if you need to do to restrain a child, you can't do that in that space, you have to move them which is not good at all, when they're very stressed … it's quite bad really, scary sometimes when you have to move the kids down (T5) *[I want] narrow corridors to be minimised – narrow corridors can force children to be confronted by others which can cause a crisis* (R25)
COMPUTER DESK
Needing a computer in the classroom

More than one computer is necessary so that staff can prepare as they go along and quickly access programmes to maximise learning if needed (R3)

Area for students to use the computer within the class which is not a teacher area / computer (R5)

One of them does quite enjoy doing writing, research on computers (T15)

Students obsessing about computers

And also somewhere where there's a computer that's locked away, so that the students who are obsessive about computers aren't distracted by them. We had ours in a separate room in blackberry cottage and that worked really well because when it was locked it was out of bounds, you couldn't even ask about the computer because you couldn't see it to ask for it. (FI2)

X has got quite a lot of obsessions that affect his learning yeah for example the computer. I mean I'd love to be able to do more ICT work with him but he's in the past got into the pattern of being he likes to be in control, and he's happy for in his choice time. If I try and ask him to do something on there, I mean I haven't really achieved it yet. It's a couple of really short things, and then he can have his choice time, but that's something we've got to work on because, so that gets in the way. (T2)

Computer needing to be screened off / protected

And also somewhere where there's a computer that's locked away, so that the students who are obsessive about computers aren't distracted by them. We had ours in a separate room in blackberry cottage and that worked really well because when it was locked it was out of bounds, you couldn't even ask about the computer because you couldn't see it to ask for it. (FI2)

Most of my students can work independently on the computer, they're a little bit slow, so sometimes they get threatened because they're just so slow which is what happens you know I'm at the computer and it's so slow at the end of the day I get angry with it (T3)

Then you've got the computer in the corner that's screened off (T7)

EXERCISE

Exercise helping students engage and calm

I think exercise as well has the same effect with that, we're really lucky here to have the outdoor area, and we get to go and have a run round outside and then after that they're able to focus more I think … I think all of those things are important because what they do with their bodies, helps with what they do elsewhere with their learning (T5)

And an exercise machine of some sort, because our kids need regular exercise, and studies have proven that if they have like 5 minute spell of working, that it should be before they do 5 minutes of work they should do 5 minutes of exercise so that they're calm (FI2)

[I want the new school to have] opportunities for movement breaks (R16)

Having easily accessible outdoor areas for outdoor exercise

We've got one young man who just before you came had to go outside and walk up and down just outside here talking deep breaths because what we've taught him when he starts to get angry when anything happens and he starts to get, if he gets deep breaths he can come back in and he came back in and said I'm feeling a lot better now (T3)

This whole exercise idea as well, I mean I've used that with my students in FE before, we

used to, now we all go for a walk or do some sort of exercise first thing, I've been doing that the last couple of years with my bigger lads in FE, there was always one of them out, at every part of the day, doing a walk around the circuit, just because it was another activity, it was sort of on their schedules, and, if they weren't occupied with something, they were trying to create problems, or, and it was a good way of sort of diffusing energy, and when they came back they were far more able to concentrate and sit down and interact appropriately (T4) *Easy access to open areas, outside areas, think that's really important* (T8)
Having equipment for indoor exercise
we had a trampoline that's permanently in his choice area. I've actually got 3 trampolines in this classroom, and they are very useful, because, they need exercise (T11) *An exercise bike is very good* (T12) *And maybe as far as something like physical activities, more stimulating PE type stuff like climbing things and climbing ropes, you know things that actually stimulate the students to move* (T13)
Having equipment for outdoor exercise
Along that sort of line. I think we should have a zip wire. There's this new craze thing, you know these 'go out' places (T13)
Access to outdoor areas being weather-dependent / requiring staff
But if you haven't got it because it's raining you can't use it (FI2) *you haven't always got one member of staff to go out for a walk or in the play pen (T4)*
FURNITURE & FURNISHINGS
Furniture being appropriate
[I want] furniture to be appropriate [in the new school] (R6) *[I would like the new school to have] well designed furniture specifically with our students in mind* (R10) *[I would like the new school to have] equipment whose quality is respectful of the children* (R21)
Furniture being flexible
See we've got a lad sits there and he's… we've got a problem with him. He'll crawl under the table and run off, so we'll often just push the table up to sort of, I mean it's not sort of trapped, but it is sort of blocked in just to reduce that, but you wouldn't be able to do that with this furniture, so I mean … I think flexibility is important, because we do use that strategy with X (T7) *Furniture needs to … allow the flexibility for teachers and students to have the room arranged as to how it suits you whatever teaching methods are being employed … because obviously individual teachers teach in different ways and individual students in the population change quit rapidly so you know classrooms are re-arranged at this school quite regularly* (T8) *What I don't want, which is probably a better way to come across it, is I don't want tables that you can't move* (T14)

Furniture being uniform
Nice matching furniture. I know it sounds awful but just something that's nice to look at so that when you come and look round … like we were talking about those chairs that they were looking at that don't tip back, well if a child doesn't tip back on a chair, it's not, it doesn't matter that their chair does or doesn't tip back. But when, you know, you've got a chair that two children can use, one that does and one that doesn't and then they match and stuff, they're not, they're not gonna be all over the place … for the children as well, they you know, just look at a row of drawers there, they're all different colours and things cause they've been moved from sort of 37 different units, and they've all ended up there, any we probably have got lots of matching furniture in this school, it's just split up all over different classes. (T5) *It would be very nice if all the classrooms were uniform in one way, in that we all had similar furniture so that we all feel as valued as each other, or the students feel as valued as everybody else* (T8) *All the same furniture and things, sort of everything the same, all the tables and screens and things like that, I think it would have a much more calming effect instead of all these different things going on. I think that would be quite nice.* (T15)
Furniture being robust and sturdy
[We need] practical, flexible & durable furniture (R1) *Could do with some tables that can't be tipped over* (T6) *The furniture shouldn't be something that could be easily picked up and thrown, causing an injury to anyone* (T13)
Needing non-reflective surfaces
Rather than reflective sound surfaces, you want a lot of soft surfaces to absorb the sound. That would hopefully reduce sensory difficulties. (FI4) *Direct sunlight can be an issue, as can a shiny floor* (R2) *If the surface you give them to work on is distracting them like in art we've got like an oil top tablecloth, and we've got one student who's that interested in that oil top tablecloth, he can't do what I've asked him to do because he just wants to touch this lovely shiny surface and lick it a bit and that sort of thing* (T5)
Using the right colours
The colour of the walls [is important]… that room there, we have had that painted … it was quite dark in there really, cold I think is the word, So I think that just warmed it up a bit (T2) *Colour scheme [is important]* (R4) *Student friendly colour schemes [are important]* (FI4)
Using plain / solid colour finishes
Everything is just newly decorated so it's all plain and lovely, and it's made such a difference, so it's a pleasure to come into the class now, and we've been able to make our mark on it, it being so new, and it has made a hell of a difference, even to the students (T15)
Needing soft furnishings to absorb noise
Materials / furnishings that absorb noise [are important] (R1)

Wanting rounded furniture
[I want the new school to have] rounded furniture (R8)
Bespoke furniture being an improvement
The table seemed ok and was good in that students can't reach across to each other but can still interact (TF4) *Matt finish is excellent and I think it should be that on all furniture* (TF7) *Surface colour and finish are good … the table is very sturdy and not easily moved. The fact that it can be screwed down is very useful. The fact that it is height adjustable is very useful.* (TF8)
FURNISHING: FLOORING
Flooring causing echoing / other environmental noise / needing to be sound-absorbent
As I'm speaking now it echoes, it's not clear. So the flooring… there's no reason why we couldn't have like polyester flooring. (T10) *I think the floor covering needs to be looked at. You know this is a shocking floor covering … This floor covering is ok for cleanliness, but it does create an echo at times.* (T11) *You've got to think about, when I've talked about noise, it's also it could be internal noise as well, like scraping of chairs.* (T13)
Flooring needing to be cleanable
I'd prefer to have this and it's easier to keep clean and that type of thing so, more hygienic I think really, if anyone wets themselves of anything then it will be fully got rid off in here rather than soaking into the carpet. (T1) *[We need] easy-clean stuff* (T7) *We've had carpet in the past but that gets dirty, it gets it's soiled shall I say, and that's not hygienic after that is it?* (T11)
Flooring needing to be durable
This new flooring, we've had down is better than carpet, so a lino rather than carpet type thing … We used to have carpet. And its kind of disintegrated over the course of several years. And so we've now.. it was getting dangerous, we were gluing it down, the edges were coming up and we were gluing it with PVA glue and wall staplers (T1) *The flooring that is easily cleaned, and stays, because this floor is a bit old now isn't it* (T2) *Look at my carpet. A few holes here and there* (T6)
Flooring needing to be suitable to sit on
It's not great for seating on as well really, you know, it's cold this sort of vinyl, and we do we sit on the floor a lot, whether we're doing sherborne or intensive interaction, we're always on the floor (T5) *We didn't have those big floor cushions last year, so they're a fairly new addition … cause now we've got kids that spend more time on the floor than they do sitting on the chairs* (T6) *I work wherever the student is best engaged and this is often on the floor* (R5)

Having an area of flooring suitable for sliding / wet play
Within the classroom, if you have a sliding area, and a carpeted area, if you want to do Sherborne, or a floor-based activity which involved sliding, you've got the opportunity to do both then … to have some area which is a slide area, and an area where you can have dirty play, the reason I've got my room like this because I had a sand box out this morning and stuff like that, so they've got an area where it doesn't matter what happens on the floor, and I've got a quiet area as well, and I had X's room done in the same way, so you've got a quieter area and a mucky area. (FI1) *[we need an] area for 'messy' activities* (R1)
Not using carpet
[I would like the new classrooms to have] no carpet on the floor (R10)
FURNISHING: UPHOLSTERY
Upholstery needing to be waterproof / washable / easily cleaned
We have cushions and things to sit on, but again the students in this class are not fully toilet trained and we have lots of accidents and that's the problem when you've got cushions and bean bags and stuff, to try and get them washed. (T5) *[We need] easy-clean stuff* (T7)
Upholstery needing to be robust
Every screen that he ever had, he'd bite it and then just spend his day twiddling the strands. So this is another aspect you've got to think of. Children who will destroy that because it's soft material (T11)
FURNITURE: GROUP TABLE
Tables needing to be height adjustable
They need furniture appropriate to height (R5) *[It's a problem] if the tables are the wrong height* (T13)
Needing adequate space for staff
Seating arrangements … Layout [is important] (R4) *Appropriate space between children to reduce distraction and conflict and enhance a feeling of security [is important]* (R21) *The child does need to be able to have visual contact with his teacher / classroom assistant* (R25)
Tables needing to be more flexible
Every class should have some [tables] in various formats and sizes (TF1) *Perhaps include a smaller curve so that the tables can be joined easily but also used separately for smaller class groups* (TF8)
FURNITURE: WORKSTATIONS
Workstations supporting students to focus
I have worked in TEACCH classes where the students having their own work stations has enabled them to focus more on the task that they're doing (T6) *The individual workstations give a personal area and ownership for students. They can also*

use them to keep noise and visual stimulus to a minimum (R15) *…the child also needs to have their own individual space where they can work quietly and is able to concentrate with minimal distractions* (R28)
Desks needing to be wider to accommodate larger tasks
This is set up for one of our more concrete children, right, we need the shelf there, that's important, so that tasks and activities can be positioned there, ready for them to pull off, right, it's no good them having thin trays like what we do for some of the other children, they've got these big bulky tasks that they need to pull off, and they also need somewhere to drop them in, there, so that they're out of sight, so you can see that the full width of this is from the start of the shelf to the end of the bucket, which is about 1600mm, I've measured it again, and they need that facility for a box there which is out of sight, and shelving there which they can balance those on. (T11) *The option of wider workstations is needed to accommodate those with bulky tasks (TF8)* *Width of workstation is narrow, optimum width would be 160cm, though some students may require a chute into a box at one end (TF9)*
Workstations needing to be (more) flexible
"I would want it to be flexible, flexible in terms of being able to put different systems in, and not all have the same look, because again, you know you're always looking at the individual rather than the class as a whole, you know it is looking at individual students, so that's what I would be hoping for" (T12) *These kids aren't in physical TEACCH, they're in work systems that are TEACCH based, but they're not in a particular TEACCH structure. They don't need screens around them, they don't need . They need to be treated with the respect in the fact that some kids do need physical structure, others don't. If they don't need it, don't put it in place* (T14) *The work station desks really need to be of varying widths or adjustable widths (TF7)*
Workstations having suitable screening
To have work stations that are suitable and reduce visual stimulus from around, I think that's very important (T7) *One particular student I can think of would very easily be distracted, if the screens that he's got, he could see over, he would much rather look over the screens than concentrate on his work … and I also find that quite a few of them do need a screen behind them… we moved screens, we actually put card on the top of the screen so that it was like a sun shield at an angle, so a) it stopped him looking out and being distracted by what was around him, but also so then he didn't have the light coming in.* (T13)
Workstations needing to be sound-absorbent
I don't know whether it is possible with workstations to incorporate a bit of soundproofing, I think when you put your head inside a telephone booth it is slightly soundproofed (FI1) *Maybe when he sits in that little cubicle, because it's not padded, like these are, that he's getting echoes, a funnelling down of sound, you know? Have you ever sat with your head inside, if you go to the playground or something, your head inside a pipe or something like that, it just echoes all round you* (T11)
Screens needing to be more robust
Every screen that he ever had, he'd bite it and then just spend his day twiddling the strands. So this is another aspect you've got to think of. Children who will destroy that because it's soft material (T11)

The screen part of the work station appears to be made of the same materials as the one in X's old room? If it is then students will quite easily be able to damage it as Y did with his head banging. If this occurs there are also sharp splintery edges (TF4)

Blots should be used instead of screws to attach screens to strengthen sides (TF8)

Worksystems needing to be available in different sizes to accommodate different sized tasks

This is set up for one of our more concrete children, right, we need the shelf there, that's important, so that tasks and activities can be positioned there, ready for them to pull off, right, it's no good them having thin trays like what we do for some of the other children, they've got these big bulky tasks that they need to pull off, and they also need somewhere to drop them in, there, so that they're out of sight, so you can see that the full width of this is from the start of the shelf to the end of the bucket, which is about 1600mm, I've measured it again, and they need that facility for a box there which is out of sight, and shelving there which they can balance those on. (T11)

When thinking about the work stations I wondered if there was a wider one where on the left shelves could be put to put tasks as not all students work from small files in front of them. Many take items from the left and finish on the right (TF6)

A variety of shelving for tasks would be needed depending on the tasks a student was working on (TF7)

Screens needing to be adjustable in height / removable / addable

The height of the screens also needs to be adjustable and they need to be easily removable too to facilitate more or less structure as required (TF7)

Workstations need some more flexibility … the option of removing screens or having a smaller screen is needed (TF8)

With a screen behind there would be a good solid feeling of being enclosed (TF5)

HEATING

Classrooms having poor heating

The problem is we've got these silly little wall heaters and they work really well when they're left on, but if somebody switches them off in the evenings and they don't come on again until I get in again at 8.30 in the morning, the temperature just plummets (T6)

The heating system up there is not very good, we've got sort of blowing hot air that goes across the room and it's either very cold in there or if it's warm it's like a very dry heat because of the air blowing all the time, and it's noisy (T8)

Temperature in the old classroom it used to be freezing, … Down here, we've just had new radiators put in, so can't complain about that (T9)

Teachers needing to have control over heating

We were always phoning and saying turn the heating up … It is cold, but we can control the temperature ourselves, so the heat's not an issue (T9)

I want it to take account of … the control of the heating aspect, and also the control of the lighting (T10)

We need to have a way of controlling our own environment, individually, it's no good the

boiler house controlling it on a winters day, we've got to have our own control in here, I mean at the moment the heating's on at the moment, you know we can't turn it off … its all gotta be controllable by us, and out of the control of the children (T11)
KITCHEN FACILITIES
Water needing to be under control of staff
We had a huge big bath in there that we took out as it was just in the way, it just didn't work… people were flooding it, climbing in it and stuff so we took it out (T3) *Let me tell you about the water supply, this is the environment as well, 99% of autistic people have got a thing about water. Whether playing with it, splashing it, turning the tap on, flooding the place… so the flow and duration of the taps needs to be under our control as well* (T11) *Everybody needs water in the classroom or the facility for getting water in the classroom but at the same time that needs to be addressed in respect that some students have water fixations so its got to be easily accessible, but not too easily accessible.* (T13)
Classrooms needing access to water / sinks
They took a sink out, and I think that throws the boys completely… it's thrown me as well. You don't realise how often you go to wash your hands, or get the squash. The boys, you now, we've trained them at snack time, right, put it in the sink, and now they're like, Oooh.. you know there isn't a sink! So perhaps, perhaps a sink (T9) *Everybody needs water in the classroom or the facility for getting water in the classroom* (T13)
Needing kitchen facilities to teach life skills
I think for that 16-19 with the emphasis on life skills, and the emphasis on doing as much as you can to support yourself because when you leave here that's where you're going to be, then the facility that they want may be different from the school facility that we're thinking of. It may be that they might need a bungalow with a kitchen and a toilet and a shower and other areas that they'll associate with when they leave (T3) *They took a sink out, and I think that throws the boys completely… it's thrown me as well. You don't realise how often you go to wash your hands, or get the squash. The boys, you now, we've trained them at snack time, right, put it in the sink, and now they're like, Oooh.. you know there isn't a sink! So perhaps, perhaps a sink* (T9) *[There needs to be a] life-skills teaching area* (R5)
MATT LAMINATE
Using / wanting to use matt laminate
I've seen it [matt laminate] in X's class and it is good (T2) *we use a lot of laminate in here, and as you know it is shiny isn't it, and I would love to have the, the matt finish, I mean if you're struggling to to make sense of what you're looking at, then that doesn't help does it?* (T11) *Matt laminate [is good because it's] not visually distracting* (R5)
NATURAL LIGHTING
Classrooms needing large windows/ natural light
We don't really get a lot of natural light in here because of the windows. (T2) *In the winter it's so dark in here, and then in the summer when the trees are properly*

leaved up it's just, it's like being in the middle of the jungle…It's very dark in here. (T6) *The more natural light the better* (FI2)
Sunlight affecting students
What would prevent students [from engaging] … excess light, or reflection of light (T4) *I don't know if you've been in that classroom underneath the games room? There's a really bad problem with sun coming in … for the afternoons in summer that is causing a really big problem. And we've made sort of stain glass things to put in the way but they get ripped down* (T7) *The windows up there, if you can see the windows up there, I've painted those in, to cut down on the sun and light coming in. At one time, anybody sitting along that side of the table, had a stream of sunlight first thing in the morning, straight over them, so that's one thing I've put in* (T11)
Reflection of light affecting students
What would prevent students [from engaging] … excess light, or reflection of light (T4) *Windows. I've got one that looks out to the trees. When it's sunny, one of the boys… that really really distracts him so I have to face him away from the window so he faces into the room, because if he faces out of the room, he looks out and looks at all the pretty patterns and the leaves on the trees* (T5) *It's the same lights that they've got in like the admin department, and the ICT department, and I think it is special lighting … it doesn't give off reflections and they don't buzz, because usually you find with fluorescent lighting you've got that bzzzzzzzzz, and they haven't got that. So they've been great.* (T9)
OTHER CONSIDERATIONS
Classrooms needing to be flexible
Some variety and flexibility in designs would be of value (R2) *We change it [classroom layouts] each year as well … we have to change the structure of the room to accommodate students as they come through.* (T3) *We need something that's going to see us into the next generation of children we have here, because perhaps we won't have big classes, perhaps we'll need smaller spaces for individual children like X, perhaps we'll need big classrooms, you know we just we don't know what we'll need, so the more flexible the design can be the better* (T5)
Needing an observation mirror for visitors to observe from outside
Visitors coming in and out … it does break the engagement at times, because you're aware that, and they're aware that there's somebody in and you know 'ooh perhaps then I'll push my luck a little bit now, because she's not gonna shout, because we've got somebody in' (T9) *They're gonna turn this in to an observation room ... they're gonna bring visitors through, to look at us, that's the idea of it. So they don't disturb the class* (T11) *Probably actually both classrooms there's an isolation element within it which actually gives the kids security because they've not got people coming backwards and forwards all the time … because they are a little bit freaky when it comes to other people and people coming in, so it's away from that* (T14)

ROCKING CHAIRS

Students enjoying rocking and it being important for calming

When they get in stress we've done things like rocking and that sort of thing (T5)

Rocking is important to these children, and I don't feel that it, we should ever take that away from them, that's another way of self-regulation, so if someone is stressed, they tend to rock, through stress, through boredom, or through other things in their life. So, they're still given the opportunity to rock, but in a controlled environment. We gave him one of those Ikea chairs, you know, that's all one frame … Yeah, he broke it first thing he broke on it was one of the pins that goes through it, the metal poles that go through, we had that replaced and within two days he'd snapped the frame. He just, no rocking was enough, no amount of motion was enough. (T11)

He's always rocking you see, and jumping, but I think he does it as a calming thing, and I don't see it as a problem to be honest (T15)

Rocking chairs needing to be robust

Rocking is important to these children, and I don't feel that it, we should ever take that away from them, that's another way of self-regulation, so if someone is stressed, they tend to rock, through stress, through boredom, or through other things in their life. So, they're still given the opportunity to rock, but in a controlled environment. We gave him one of those Ikea chairs, you know, that's all one frame … Yeah, he broke it first thing he broke on it was one of the pins that goes through it, the metal poles that go through, we had that replaced and within two days he'd snapped the frame. He just, no rocking was enough, no amount of motion was enough. (T11)

ROOM TEMPERATURE

Room temperature rising due to sun shining in

I have been told that once again in the summer the sun just comes through and it absolutely roasts, we'll have to, we'll have to see what we can do about that. (T9)

I had one student who was environment sensitive, he was into heat, he would absolutely flip in heat, but he didn't understand, so he'd sit in the sun until he worked himself up and went bonkers. (T11)

When the sun's beaming through it can get a bit warm. (T15)

Classrooms being too hot / cold

The heat in this room is tremendous, yesterday we absolutely baked … this is not the hottest time of the year, it was 17 degrees outside yesterday, and in here, I don't know what, I didn't look at the thermometer, but it was fantastically hot (T11)

I used to have the windows open because it was so hot in there (T13)

My classroom is too cold in the winter and too hot in the summer (R11)

Room temperature affecting students

Some of my vocal students will tell me that they are hot, and will ask for the heaters to get switched off, especially in the afternoon, when this room gets hot, you know, the environment's got an effect on how much they can concentrate and that sort of thing. (T1)

[We need a] reduction in noise and heat levels…if a room is overheated students are not at their optimum learning level (R5)

The environment needs to be warm (R26)
SCREENS
Using screens for visual structure to help students focus
The work stations are quite enclosed, I mean X has got four sides there and so has Y, and Z doesn't need it so much, but then if X and Y are particularly finding it hard to focus we've got the 1:1 table as well there which goes back to the four sides cause sometimes we do it here at group table but sometimes it's in 1:1. (T2) *screens we've got everywhere obviously, for various reasons, they've all got a reason,* (T5) *When I moved into the classroom there were lots of screens and cupboards arranged for the TEACCH structure of the previous class* (T8)
Screens needing to be sound-absorbent
Our screens as well, these are sound absorbing…they're made from material and they've got foam underneath them. So they have got some kind of sound absorbing (T11)
SAFETY & SECURITY
Making the environment safe
[The environment needs] to be safe. To be safe for both staff and pupils (T10) *Safety, safety obviously has got to come first as well... So furniture that we use. Glass that we have has got to be safe* (T13) *Telephones in each class and panic buttons [help to make the environment safe]* (R5)
SENSORY EQUIPMENT
Providing sensory equipment for self-regulation
Some of our students need swings to calm which promotes vestibular activity (R3) *It's the same with the gym balls, they all really like the gym balls and the trampoline, you know they like to go and have a quick bounce on the trampoline, or lying on their tummies on the gym balls, and again it's that sort of deep pressure thing, so anything like that would be useful* (T6) *In the choice area there's two lads in there that are very sort of sensory, so we've put a lot of sensory items in there so we could engage with them, so that's developed their engagement* (T12)
Having rooms for sensory activities
I have created quiet, sensory, messy areas (R1) *This is the first classroom I've been in with it's own little sensory area and it's like blocked off and it's probably sort of yay big and it's all blacked out and it's really nice, so I think opportunities for that. I know it would be too expensive to have in every room, but it would be good* (T7) *A really nice art room, design technology workshop, I'm tending to look at it from sort of the periphery rather than the main classroom bit, and it'd be nice to have a lot more sensory stuff going on, and music, and maybe a pottery room, that sort of thing, so I'd like to see far more sensory activity or sensory rooms available, maybe a wet room or sand, I mean we used to have sand and water, but they were in the same room, which didn't actually work very well. Maybe a ball pit or something like that, you know* (T13)

Students enjoying swinging and it being important for calming
The swing is a really useful calming mechanism … a lot of our kids, 5 minutes on the swing will take them out of crisis, just completely down, because it promotes vestibular activity in the brain (FI2) *Rocking is important to these children, and I don't feel that it, we should ever take that away from them, that's another way of self-regulation, so if someone is stressed, they tend to rock, through stress, through boredom, or through other things in their life. So, they're still given the opportunity to rock, but in a controlled environment. We gave him one of those Ikea chairs, you know, that's all one frame … Yeah, he broke it first thing he broke on it was one of the pins that goes through it, the metal poles that go through, we had that replaced and within two days he'd snapped the frame. He just, no rocking was enough, no amount of motion was enough.* (T11) *We use the swings as a calming strategy for X and now for Y as well* (T15)
Having an indoor swing
I think most classrooms could do with a swing in side, I know it sounds really weird (FI2)
STORAGE
Needing lots of storage
[We need] more shelves and more space to put pictures and things on the wall you know more space for displays, more space for files and things because we do struggle with space and things like all the games and books and things (T1) *We've had cupboards put in … the cupboards are for your stuff and our storage* (T6) *As storage goes, things need to be stored away, with the option of having them out or having displays if we want to* (T13)
TEACCH resources requiring lots of storage
We need loads of storage…particularly with TEACCH, and we've got the larger tasks and things, they take up loads of room, like construction things. (T5) *For TEACCH in particular I need a lot of physical structure, a lot of storage* (T11) *Storage for tasks … and good storage for resources / stock [is important]* (R12)
Clutter distracting students / Storage needing to be out of sight
We've taken out things that were cluttering up and we've tried to make other areas as big (T3) *When you've got clutter it's just impossible… with other kids I've worked with, they just, it's just such a problem, they're just constantly moving and shuffling, and you can't find anything. Just to have good storage where everything is sort of labelled, you can find it easily, and it's out the way and it's not causing a bother to anyone.* (T7) *Too much clutter on show around the classroom [can prevent students from engaging]* (R10)
Having choice cupboards with see-through doors
To promote expressive communication for some students it can be helpful to have items stored where they can be seen, but not directly accessed. This can elicit requests. Items can be out of reach on high shelves or in containers / cupboards that are transparent in some way. If the student has the means to request e.g. verbal, signer, PECs, this can be a valuable approach (R2)

There seems to be some sort of barrier, particularly I think for the autistic students, whereby unless they are really aware that that thing is there and available to them they're not going to ask for it… one of the students I support in outreach is a great video watcher, and on one occasion I thought it was time to move the box of videos from the room itself into a cupboard in the room, in a way to make his asking using PECs more realistic, because the box of videos is in the room, why shouldn't he just go and help himself? And yet, even when he saw the box of videos placed in the cupboard, and the doors shut, he ceased to ask… I think it may have something to do with, I don't know, executive functioning deficit…it seems to be quite commonly accepted that autistic people have a greater tendency to word-finding difficulties… if the item is there, it serves as a prompt in effect, that makes the word or the PECs symbol more readily accessible to them, in terms of a sort of mental schema for it. (FI4)
TOILET FACILITIES
Needing suitable toilet facilities
[The new school needs] to have appropriate toilet and washing facilities (R6) *Adequate washing and toilet facilities [are important]* (R7) *[I want] better toilet facilities* (R9)
Toilet areas being adequate size
Toilet areas need to have plenty of space and stuff, sometimes you need two people changing someone … big like disabled size toilets, like you see at the cinema, where you could, so you've got privacy, but … room to breathe. (T7) *I think it's important that there are good facilities for personal care… I'd rather have one really good space shared by two classes than two cramped individual spaces, so I think that's something that I would like to see.* (T8) *I've got one who's double incontinent, and takes 2 people to change, so that that's a space issue* (T11)
Having an adequate number of toilets
We've got 2 toilets very important, boys and girls toilets, doesn't always work but boys and a girls toilet (T3) *To have adequate toileting facilities, for both boys and girls, there has been in the past where boys and girls have shared the same toilet, which to me well it's a complete no no, and also separate facilities for the staff as well, cause I think that's one of the reason's why the stomach bug moved so quickly, because there's not. Staff do use the same toilet as the pupils, and again I think that's a no-no as well. I think that's one of the reasons why we all catch things, so that needs to be taken into account.* (T10) *We're gonna have 1 toilet yeah. Even 2 isn't really enough* (T11)
Needing a toilet accessible from the classroom
To go to use the toilets in here they have to go out that door and when you're thinking about independence, X is quite capable of going, but we do still have to watch him, so we give him that independence, but there's still that chance he's gonna get distracted from here to the toilet area, and Y and Z both need accompanying. It would be nice … to have a door through here straight to the toilets … because they'd be able to go much more independently (T2) *[It helps to have] your own toilets to go with the class* (T9)

Because of their developmental level, they don't have, they have bigger issues over toileting than children in a mainstream school would have, obviously, don't they, so they'll be going in and out of the toilet all day long … and then I've got 2 others, who are incontinent infrequently (T11)
Toilets needing to be robust
We need bathrooms that are appropriate so the kids can't break the toilet systems and things (T5) *This is important for the toilets, this is the best toilet system we've ever had, can you see? I mean, it's boxed in, and it hasn't got the handle, it's got just got that push button there, that's ideal. It's the best that we've ever had for that* (T11)
Water needing to be under control of staff
We had a huge big bath in there that we took out as it was just in the way, it just didn't work, so we had it in for a number of years, but people were flooding it, climbing in it and stuff so we took it out (T3) *Let me tell you about the water supply, this is the environment as well, 99% of autistic people have got a thing about water. Whether playing with it, splashing it, turning the tap on, flooding the place, so we have to turn down the flow on these on these… it's quite a lot lower than it was normally … so the flow and duration of the taps needs to be under our our control as well* (T11) *Everybody needs water in the classroom or the facility for getting water in the classroom but at the same time that needs to be addressed in respect that some students have water fixations so its got to be easily accessible, but not too easily accessible.* (T13)
Needing a shower
Also we don't have a shower in here, and one of the students needs to be washed when he goes to the toilet, so we have to take him back on to house every time he needs the toilet, so that's a problem. (T5)
Needing bathroom facilities to teach life skills
I think for that 16-19 with the emphasis on life skills, and the emphasis on doing as much as you can to support yourself because when you leave here that's where you're going to be, then the facility that they want may be different from the school facility that we're thinking of. It may be that they might need a bungalow with a kitchen and a toilet and a shower and other areas that they'll associate with when they leave (T3) *[It's useful to have a] life-skills teaching area* (R5)
VENTILATION
Windows needing to open for ventilation
The windows only open sort of a few inches, so there's not enough air flow to cool it right down, and they become ridiculous (T4) *It'd got these old fashioned windows that literally opened that far, it was dreadful* (T9) *I used to have the windows open because it was so hot in there* (T13)
Classrooms needing ventilation
[I want the new school to be] airy (T2) *I think it's kind of smelly up there* (T8)

(We need) more airy classrooms (T15)
Students posting things through opening windows
If we have opening windows, they're continually opening those and posting stuff (T11)
Fans only circulating hot air
We'd got a fan … it's a poor old thing … and once again it only circulated the hot air that was in the classroom anyway (T9)
Classrooms needing air conditioning units
Air conditioning would be useful as well … we have had an air conditioning unit that we've put in that we used in the summer last year and that's great (T1) *I think that the maintenance men have got some air conditioning units for us* (T9) *An air con unit [would help enhance engagement in our classroom]* (R11)
Portable air conditioning units being noisy
We have had an air conditioning unit that we've put in that we used in the summer last year and that's great… but it was really noisy because it was one of these ones you plug into the wall and its like a it just kind of sucks the warm air out and drags the cold air in like so that's not ideal so a proper sort of incorporated air conditioning system would be really nice as well in an ideal world (T1)
VISUAL CLASSROOM ENVIRONMENT
Classrooms having physical/visual structure to support students
The structure that we've got in here suits this group (T2) *I think with a lot of students it would be other distractions in the environment, which is I guess where the whole TEACCH structure thing comes in* (T6) *Everything in my opinion has got to be very well structured, and very secure … where you're sitting, and what colour you're following, and I think we do that very well in here* (T9)
Making classrooms a distraction-free, low arousal environment
I don't think that children are really able to learn very effectively if the environment isn't right and the set up isn't really right for them. Particularly, if there will be things like distractions and things, sensory things in the environment, particularly with children with autism, it's just, it's not gonna happen (T5) *I don't put any distractions on the walls, so you can see that below a certain height there are no visual distractions* (T11) *Visual stimulation, some students can take more than others, some thrive on it, some just can't cope with any* (T13)
WINDOW VIEWS
Students being distracted by window views
…look we can see for 10, 20 miles or so… obviously for some students that would be a complete distraction (T3) *If you've got a pupil with ADHD, you're not gonna sit him over in that corner there, because he'll be looking out the window, because that is far more interesting than I'll ever be* (T10) *Lawn mowers, anything outside [can be distracting]* (T9)

Frosting on windows to block distracting views
You'll see in some of the classroom areas we've got frosting on the windows (T5)
Students using window views to orient
I don't like to completely shut it out, because some of the things that go on in the day give them a clue as to what time it is, like when they see all the children coming up from their walk they know it's the start of the day, and when they see people pushing the red trolley down they know it's nearly time for lunch, and, a lot of the children in my class use that as a cue (T5)
High-level windows preventing distraction
Where these windows are, they're a good idea, cause that adds a bit of extra light but it's high up, and it sort of it doesn't cause distractions, you don't get people staring out the window, looking at what's going on. So they're a good idea actually, I hadn't thought of that before (T7)
WORK CHAIRS
Students rocking on work chairs
We do circle time in here so we're sitting and chatting and they're interacting using the symbols, telling us what they have been doing. And if one of them is in a particularly bad mood, and doesn't want to do it, or, wants to just show that they're not very happy about something then it's a way of doing it. I think it's sort of a deliberate ploy that they bang backwards and forwards a bit, a few of them do that. (T1) *I think the chairs are important, I know it is a problem with the rocking, just cause it isn't in here, I know it can be* (T7) *Like all teachers I suppose I do [have problems with students rocking back on their chairs]. And these particular chairs I've found are the best. The leg extends behind the back, so the foot of the chair is behind, it makes the centre of gravity low, and that makes it difficult. Having said that, X could rock one of these, and it's all stressed across the middle from where he rocked on it. So the chair didn't rock on its feet, but he rocked on the back to make that motion. So the seat was firmly on the ground but he just kept rocking back on that … the answer we found was to give him a chair without a back on, a stool, and that worked.* (T11)
Chairs needing to promote good posture/ comfort
[It's a problem] if the chairs aren't comfortable … if the chairs are the wrong height (T13) *Height of chairs [is important]* (R5)

TEACHING APPROACH

INTERACTIVE WHITEBOARD
Interactive whiteboard being beneficial
I've got students who have never shown any interest in writing at all, or colouring even, apart from a quick scribble, and will get up and spend quite a long time interacting with the whiteboard, and through that have shown more interest in doing it on paper as well so I think it's really and there's lots of activities and games which are really interactive, things that you can do on the whiteboard that you struggle to do on paper or with symbols (T1) *We've incorporated the whiteboard, interactive whiteboard, with registers that the kids tick*

off, and again ICP targets that they can see and they can see what they're trying to achieve week by week (T3) *The interactive whiteboard … I've found that very motivating, and because it's big and in your face, we're able to personalise it to children as well, so if they see their face and their name up there, that means something to them, they know, it has an extra boost to them.* (T11)
Wanting an interactive whiteboard in the new school
Obviously [I'd want to have] whiteboards in the rooms (T1) *Having the flexibility to use more technologically advanced different things, like, we'd love a whiteboard, we haven't got one here, and I think we could make good use of one here* (T5) *The interactive whiteboards in every class. We haven't got one, and it really would be of benefit for these students up here, all of them really, but the more able students I think there would be much benefit.* (T15)
Using the IWB
[We use an] interactive whiteboard [to support students to engage in learning] (R9) *[We should] use the [interactive] whiteboard more* (R13) *[I use the interactive] whiteboard to engage students using sounds and moving pictures … and to bring them [the resources] to life* (R15)
Sunlight affecting interactive whiteboard
The light also affects the interactive whiteboard … it just goes altogether, you can't see it, it just fades out altogether (T11)
Needing more time / training to use IWB effectively
We've got a long way to go in terms of developing resources and materials and that sort of thing (T11) *[I would like to have] more training on the white board.* (R14) *[It would be useful to have] more use of the whiteboard if we had more training and time to prepare resources* (T15)
Interactive whiteboard being robust
It's more durable than we expected, we thought it would be in pieces after a few days (T11)
Needing to be aware if students do not respond to the IWB
We've had the interactive whiteboard, and that's made a huge huge impact on two [students], perhaps not the third one (T9) *I think we do have to be cautious like I said that not all children are going to respond to it so you have to be careful, you can't just have a whiteboard going on in the classroom for everybody* (FI3)
INTENSIVE INTERACTION
Using / wanting to use intensive interaction / interactive approaches
We're a more intensive interaction approach in our class, so our classroom is quite free of furniture structures, we have one big set of tables where we all come together to work and

to eat and then we have for a particular student we have a separate table where he works 1:1 and then we have a big area for soft chairs where we all congregate to interact with each other and to do social things, and also greetings in the mornings and afternoons (T8) *I'll have some lower ability pupils, and I'm thinking more towards intensive interaction … I know at least one pupil who it would be fair to say he's a candidate for being in an II class, so I'm looking more towards that. Cause I've worked with him in the past, and I was just chatting about him today to someone who's been working with him, and he's so low in ability that, table top work is, he ain't there yet. You know you wouldn't do table top work with a baby, and in lots of respects with this pupil, attainment level is you know in months rather than years. So, I'm moving more towards intensive interaction. I did a bit of it last year, because X who's in Y's class was in my class last year, so Y she assisted and gave us some ideas with how we could work individually with this one pupil who's now with her full time. So that's something I'll be looking towards when in my next class.* (T10) *They want more play, they're building more play and they want children to be able to play more, if we just played all day they'd learn so much more, but no they've put a lot more emphasis on play and the importance of play, which we know it's massive if children can play they learnt the basic skills and so it's really interesting* (FI3)
Intensive interaction encouraging communication and/or engagement
We use intensive interaction approach to encourage communication and engagement in general to develop those skills, so that enables learning to take place (T8) *Intensive interaction gets them engaged to start with, and then from that engagement if they're enjoying themselves, they're far more likely to give you what you want, if you know what I mean, in terms of focusing on what you want them to do, either through withdrawing from the engagement and referring to going back to it, and so they have to produce some work for you or concentrate on what they're supposed to be doing, and then we will do it again, or because you've got them engaged, you can then draw them into being involved in what you want them to do.* (T13) *One young lass, it's paying such dividends, she's never initiated and yet last week we'd been doing some hand massage, and she'd been making exchanges for what she wanted, and then I decided that I was going to lie on the floor with my face down and not do anything, and she actually came out from her corner, across the room, and then tapped me, and lifted me to see me, and then gave a hug. And it's the first time she has ever initiated, but because you're giving them more space, you're honoring what they're doing, and then you just withdraw and wait for them to come towards you, so it's very much an intensive interaction approach, but there are subtle differences.* (FI1)
Intensive interaction calming
Intensive interaction frequently puts a child into a "learning" frame of mind if used at the beginning of a session or when student seems stressed (R5) *I use intensive interaction with this lad here. He's very sensory, he likes to use sensory things, so we give him sensory objects to play with, sand, play-doh, that kind of thing, but also, if for example he's becoming anxious, then a good calming strategy is to use intensive interaction where you mimic everything that he does, so if he makes a sound you mimic it back to him, and if he makes an action you mimic that as well. And that quickly calms him down … it enables learning by bringing him down* (T11)
Providing a responsive environment
I mean I've got a fantastic team that are all always really open to the students … we always try to respond to the kids as much as we can. (T6)

Particularly the students that are using TOBYs, we're finding because they're having to give us a TOBY for every piece of fruit, not a whole fruit but a cut up piece of fruit, we've found for example sitting with the two of them, I've got one either side giving me a TOBY, if I'm dealing with another student, then they're giving you the TOBY but they're also making physical contact to attract your attention, and giving eye contact as well, that's improving a lot over the term, because they're almost in a bit of competition between the other person and you and themselves, to get what they want. But they've got the means to do that by physically giving you the TOBY, but then that's been developed into physical contact and eye contact as well, and one of the students is also saying juice now, so that's all coming along, yeah so that's one example. (T8)

*The most important thing is to go at the learner's pace and show that you are interested in what they do. (*R26)

FOCUSED CODES FOR OTHER TEACHING APPROACH / PEOPLE ISSUES RAISED – (organized alphabetically within theoretical codes)

ENGAGEMENT
Engagement essential for learning
I think, until you've got the students engaged, there's going to be very little learning taking place (T6) *If they don't engage then they can't learn… they don't need to be distracted, they need an environment that is conducive to engagement and for learning* (T13) *If they're not engaged then you can't teach, so they need to be able to engage in what they're doing in order to teach* (T14)
Indicators of engagement
You can sort of get a feel of how interested they are in an activity by their behaviour and their eye contact. But also, because of the nature of the students I've got, we're quite used to them starting an activity, getting up and walking off and them coming back, umm and I think that's quite important to give them that time to be able to 'yes I'm really interested in this, but I just need to go and walk across the other side of the room and get rid of some energy and then come back to it.' Generally, as long as they're engaged with the person that they're doing the activity with, I think they're quite engaged in what they're actually doing. As long as they've got some sort of relationship and interaction going on with the member of staff that's working with them, then you've got a fairly good idea of how engaged they are in the activities. (T6) *Students have to engage with other people and their environment and any learning materials that are presented to them, in order for their brains to assimilate any information that's out there so that they can actually engage with that, otherwise they can't learn anything about it, you know if their senses aren't picking up what's around them, then the brain's got nothing to process, and so no learning will happen* (T8) *The first one really is their input, the time they spend on task, you've got to bear in mind of course their concentration span. The possible results of what they've done … mood indicators, I mean if they appear to be happy, if they're happy they're more likely to be engaged, and if they've done work that they're proud of, they're gonna be happy* (T13)
Indicators of disengagement
If you get negative behaviours start coming in that's when you know that they've lost that focus. So that's the indicator really, definitely for Y and Z. (T2) *…there's a student over there who's very good at not being engaged, cause he'll look*

everywhere but where you want him to look, so he'll be doing the task, but he's, he just will not focus on it, so you know the day that he has looked, even if briefly, you know for that brief moment he was engaged and he has followed what you've said. So you need to know the children, to be able to pick up whether they are engaged, or whether they're you know, not quite as engaged as you know that they can be. (T9) *Obviously any challenging behaviours they'll display when they're not interested in the activity or use it to escape, which many children will do for a lot of things* (T15)
STAFF-RELATED ISSUES
Importance of staff
We quite often work one-to-one with students so they're sat right next to them and they're pointing and helping the students to engage and showing the students exactly what we want them to engage with at a particular time. So yeah, they're really important (T1) *In this group you have the greatest influence when you are working 1:1, so it's 1 staff to 1 child* (T2) *I think obviously there is a big influence of staff to students, but in my experience at X, its all been very positive* (T8)
Staff attitude & approach
Who's doing the teaching, who's facilitating the learning is a very important thing (T5) *There was a quotation from Tim O'Brian, his book on challenging behaviour, you know that we should aspire to be super models for the pupils to aspire to* (T10) *I think that you need, as a teacher, to be organised, well in advance, to be able to make the boys' day as smooth and as flowing as it can possibly be.* (T9)
Staff knowledge of autism / individual students / teaching approaches
I think we take it for granted at X how much we do… we just show people how it works, but we do it hands-on so it's like a working process rather than, I mean we do do some staff training absolutely, but we do it alongside doing the hands-on so that you know they can see it working which I think is important (FI3) *You get to know the children, you've got relationships with the children, it's not just I suppose like a primary school where you've got 30 children coming in and out every day, you've got three, and you get very attached, and very close, and you get to know them personally somehow, their likes, their dislikes, their own personalities and sense of humour* (T9) *Apart from one member of staff who's agency staff, we've all been on the intensive interaction course, so we are aware of the principles behind that, and how we're trying to work* (T8)
STUDENT-RELATED ISSUES
Peer groupings
Their tolerance of each other [influences student engagement] (T4) *The same student as well is very noise sensitive. And the one that sits there is really loud and squealy, so it's difficult* (T7) *Dislike of peers [causes] anxiety [which prevents some children/young people from fully engaging/learning]* (R23)

Internal student factors
Obviously with some students if they've got obsessions with specific things, that's gonna be some sort of barrier to them learning (T6) *Like obsessive behaviours and like we've got flickers, so if there's something she's decided she wants to flick rather than listen to what we're doing and participate in that then she she'll run off and grab it* (T7) *If they're not very well they're not going to engage as well* (T15)
Students having choice / input into decisions
It is important "for students to have input / choices in things they like / dislike" (R20)
Number of students
If a room is overcrowded / overheated etc students are not at their optimum learning level (R5) *Extraordinary circumstances have meant that another student joined us … seven students, too many* (T3) *Sometimes also the number of peers as well [can influence engagement] … we've got five in this class … altogether we can do so long around a group table, but then … the noise level escalates and no-one gets anything done … So sort of group size really I think is important as well.* (T4)
TEACHING APPROACH
Appropriateness of teaching approach and resources
The class team we're at the moment trying to make PECS for the choice room, cause at the moment it's just a big sort of free for all, and they play with what they want, but we're trying to make trays for their individual toys, that they select what they want, so that's making that a bit more engaging (T7) *You pitch content to the levels that the students are at, because you're more aware of what they're capable of engaging in and what with* (T8) *Generally that the teaching is… either targeted at the wrong level, or it's not differentiated enough for the individual student, so you need to very your teaching styles depending on the kids that you're talking to, and that can be four kids around a table, and varying the teaching style for each one* (T14)
Appropriateness of the curriculum
Children need an appropriate personalized curriculum that takes into account their cognitive level and their level of engagement so that teaching activities can be pitched correctly. Children will want to learn and be engrossed in their learning if the level of engagement is well matched to their abilities (T3) *We need to sort of be looking at the curriculum really to make it more appropriate, for the students that we've got and the needs that they have* (T4) *I think there's a gap, between what is Z's curriculum, and what are the learning needs of the pupils. I think it's more pronounced for the key stage 4 pupil, because he's more akin to aspects of the national curriculum in terms of we have to use the word science, FE's slightly less restrictive, but I feel that the, the curriculum, that we have, is a catch all curriculum, which doesn't necessarily satisfy the individual needs of the pupils. But we are. I think we've stayed with this for a while now, and umm we're about to umm role out the new curriculum, which will be more individually based on the outcomes of the every child matters document, and I think X's gonna speak to us tomorrow night, about introduction of*

that. (T10)
Benefits of the TEACCH Approach
Using the structure of his TEACCH workstation we'll sort of focus him on something else, and he'll calm right down. (T4) *We do use TEACCH but in terms of the work stations we use them probably more as a calming strategy* (T7) *In this case … if he's sitting at a group table and he's becoming anxious, which he can do occasionally, then I immediately send him to his work area, and that has an instant calming effect, the structure of that around him, that's surrounding him, and the fact that he's got familiar structured activities to do, mean that he calms down* (T11)
Consistency of approach
We work very hard as a class team to get a consistent approach to all the students so that across the staff themselves, and also if possible across the students so that one student's not thinking well why are they getting away with something that I can't get away with … on the whole we try and give a consistent approach across students and also a consistent approach amongst staff so that some students don't know that if one member of staff's out of the classroom that they can get away with more than they could if the other member of staff was there. (T1) *For the older student for their accreditation for example, when they have to learn to dress appropriately, instead of just doing it on house, we've brought clothes in and we've shown male and female clothes and where they go, and where they fit, what they cover, why they cover those parts etc* (T8) *Particularly when students are distressed, if you use visual cues, it does make a lot of difference. Because they need to be used when the students are distressed, they need to be aware of what they are when they're not distressed, so you have to use it continually* (T13)
Drawback of providing too much structure
I think it's a fine line. What are we, what are we trying to do with our pupils? Trying to learn to live in an unautistic world, or are we trying to introduce things in a more autistic friendly way? And we've a bit of a dilemma there really, because although we have a TEACCH structure operating round here, it doesn't necessarily follow that they will carry on with that post 16. Now I know in America, TEACCH in North Carolina, that largely it can be from cradle to cradle, so they'd stay on the same facility, they move around the facility, but the structure would be in place no matter whether they're 15 years old in class or 35 years old doing some form of work experience. We haven't got that linked together facility at the moment, so I think, yes I think we need to use the TEACCH structure, but we've got to give them some coping skills as well, because there may not always be that TEACCH structure in life after X. (T10) *Not only that it makes them extremely difficult to place in the future, the more physical structure you've got around them the more challenging it is for post-19 provision to actually provide that structure that they need* (T14) *I've worked in another class where it was very highly structured, and I found that when you took the students away from that structure they just went to pieces, and I disagree with it being that extreme structure, because as they move on, I doubt very much unfortunately that they are gonna have all that structure, and if they can't handle it then it's gonna go down hill quite quickly. So I think there needs to be the structure, but there definitely needs to be the flexibility with it as well, which we try to do in this class* (T15)

Making learning meaningful and motivating
I always go back to this enjoyment thing you know if you can get student to enjoy coming up and what you're doing is so relaxed and so umm funny and there's enjoyment in it and then I think that the teaching strategies almost work for themselves (T3) *We've been on several shopping trips which are obviously taking the students out into their communities as well, so they can engage with the environment outside of X* (T8) *Doing things that they enjoy doing is one of the most important things, and if you can engage them in that respect, and if you can find a key to get in, and let them research themselves, you'll just get so much more work out of them. And much more independent work … I will direct their learning into an area that they like, and then allow them to research it themselves independently, or with limited support. So that it goes into an area they think they like* (T14)
Making tasks short / manageable / achievable
We kind of have like a carousel effect in here where we have a group circle time and everyone goes in there and then I have one activity here, 1 activity there and 1 activity there, and then one person with the remainder in choice time, we just kind of go and grab and take back and grab them all day. (T7) *So if I wanted X to go to the shop and buy something, I'd probably teach him the value of money, what each individual coin is first, then I'd teach him to count money out, right, as a separate activity, but each one of those activities has different steps, small steps in it, and then teach him to go to the shop and do the transfer, but I could do that in the classroom, before we went, pay for something, so that's task analysis, I'm breaking the task down into small parts* (T11) *Everything I think has got to be done in short small bursts on a regular basis, to keep the interest there, and making them want to go back and do it again and again* (T15)
Personalising teaching
This is a very diverse group as well, you really have to differentiate, cause some could understand and comprehend just speech, and talk to you about a subject, whereas others really need very basic symbols, minimal sort of symbols about a topic, or they completely get swamped you know, so you have to, some can read, and others have to use matching symbols cause the words mean nothing (T4) *I think it [the teaching approach] varies from student to student* (T7) *With all of them, it's what suits that particular child, you can't be, you're all going to be TEACCH, you're all going to be this … because what works with one child may not necessarily work with the next, unless you tweek it, it's the individuality of the approaches that's the important thing, use the principles but they must be individualized for that student.* (FI1)
Recognising and targeting students' differing learning styles and preferences
We use everything really. It depends … I think I'm open to as wide a variety as I can. I do try and kind of look for any approaches or strategies that I see around that I think will help the students … quite a few of my students really enjoy the role play we do, we go down and do zippy's friends with X and they enjoy that. It's really just anything, symbols, pictures, talking to them, using the structure of the room, and the environment. Take them out to experience things first hand, going out to the community, going round to the farm if we're gonna do something about science, and maybe animals, take them down and let them see

first- hand the types of things like the growing cycle, so we actually take them to a garden centre and they buy bulbs and plant them in the soil and water them and watch them grow and that sort of thing. And you back that up with working pictures from books and symbols so it's trying to incorporate as much as possible with all the students really to try and get them to engage with it as much as possible through a variety if different means so. (T1)

We try and match that [the teaching style] to the level of the children, obviously, so our instruction. But that can mean gestured prompting, to do the right thing, can be modelling, although modelling doesn't work in except in a few circumstances. X for example, could understand me if I modeled anything to him, but he's a rarest exception, in my opinion. They don't respond, they don't know how to copy generally. So, we, we'd use gestures, or hand-over, physical hand over. I did some research on ABA with a colleague from Turkey a couple of years ago, and he taught me how to use ABA methods, so I quite frequently use those, and that involves giving an instruction, written, picture, what ever, probably backed up by verbal, or even signing, and, if they don't respond within a certain time limit, usually about 4 seconds, you physically get their hand to get them to move it. (T11)

I've seen examples where if someone who doesn't know the student can be saying 'Go to choice, go to choice go to choice' and they're distressed, but you just show them the symbol or picture or whatever and they're far more likely to then go into that situation, or come to the table and do work, or go into 1:1 area, or whatever. (T13)

Staff being willing to get down to the students' level, follow students' lead and give students a degree of control over their learning

Willingness of staff to immerse themselves with the children [is important] (R1)

They think they've got control over their learning, and it's having an overview of what they're doing and making sure that they're covering the areas that you need them to cover. So it's a bit like sly control. Cause they think they've got control … which is ok, you can give that control, but you do need to make sure that your overview is taking them into the direction that you need them to go, but… they've got to think that they're doing it because they want to do it. (T14)

You also have to have that laid back approach with him, so I like to, when I do some 1:1 work with him I sit down with him and we'll have a chat about something that he's interested in, and we'll incorporate it into what we're doing. And just so you're on the same level as them, even though you're teaching them it's not about you know you've got to get this done and this done, it's got to be done at their pace… but if you're quite relaxed with it… they tend to just go with it (T15)

TEACCH limiting opportunities for social interaction

I do like independent work to be purposeful, I'd rather them be out interacting in the choice room than sat in there a long time (T7)

In the class I'm working with now, there isn't that very tight TEACCH structure at all, we have some elements of communicating to the students through schedules and photographs and some objects of reference etc, you know where they need to be and what's going to be happening, but it's much less structured because we're trying to encourage the students to initiate interaction more (T8)

The workstations aren't used as much as they used to be, purely because, they are far more sociable now, than they ever have been, and I see that as a positive. I am very pro TEACCH, … but I think if they're enjoying and interacting well at the table and it is not distressing them, and they are getting the work done, and they are achieving their targets, I think that the more sociable that you can teach them to be, the better (T9)

Using a variety of approaches
Structured teaching, rote learning … cause and effect activities etc (R1) *There's such a wide variety… they're doing sort of group things… and they'll interact with someone in there, and then they'll come and do something different in here* (T7) *In teaching some activities, we do a lot of task analysis, so we break the task, an activity down, into simple, single steps. Right, so they can cope with a single step. Sometimes not all those steps are put together, they may be separate if there are too many, and then put together at the end, they all come together … You've got options about the way you teach those tasks, for example, tying shoes, you do it in reverse, backward teaching, have you heard of that? That's another strategy.* (T11)
Working with parents
Staff also need training and appreciation of issues relating to parents' wishes and concerns, as dealing with parents can form a crucial element in the delivery of services for children with ASDs (R25)

APPENDIX 9.0

KEY TO ENGAGEMENT SCALE DATA

Table Heading	Explanation
% Auth. Mat.	Percentage of observations within session coded as authentic engagement with materials
% Auth. Pers.	Percentage of observations within session coded as authentic engagement with a person
% Engage	Percentage combined active and passive engagement
% Ritual	Percentage of observations within session coded as ritualistic engagement
A-Non	Number of observations within session coded as active non-engagement
Active	Number of observations within session coded as active authentic engagement
All	Mean percentage engagement for all group activities
Auth. Mat.	Number of observations within session coded as authentic engagement with materials
Auth. Pers.	Number of observations within session coded as authentic engagement with a person
Circle	Mean percentage engagement for all circle time activities
Games	Mean percentage engagement for all group games
Mean %	Mean percentage engagement
No. Adult	Number of adults in the classroom
No. Children	Number of children in the classroom
Non-E	Percentage of observations within session coded as non-engaged
Out of Sight	Number of observations within session where student left the room
P-Non	Number of observations within session coded as passive non-engagement
Passive	Number of observations within session coded as passive engagement
Ritual	Number of observations within session coded as ritualistic engagement
Stage	Stage of research (as defined in key for the relevant tables)
Total	Total number of observations collected within the session

APPENDIX 9.1

1-1 ENGAGEMENT SCALE DATA

Stage Key	
Stage 1	Old Table
Stage 2	New Table
Stage 3	New Chairs
Stage 4	New Flooring

1-1 ENGAGEMENT SCALE DATA – SIMON

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	13	8	2	0	1	2	6	4	1	77	88
26/09/2007	Wed	AM	20	4	12	0	3	1	6	4	1	80	
10/10/2007	Wed	AM	20	7	12	0	1	0	6	4	1	95	
11/10/2007	Thur	AM	14	11	1	0	1	1	6	3	1	86	
15/10/2007	Mon	PM	20	17	3	0	0	0	3	3	1	100	
14/11/2007	Wed	AM	10	10	0	0	0	0	4	4	2	100	98
05/12/2007	Wed	AM	20	20	0	0	0	0	6	3	2	100	
05/12/2007	Wed	AM	18	13	5	0	0	0	6	3	2	100	
11/12/2007	Tue	PM	20	15	2	2	0	1	6	4	2	85	
23/01/2008	Wed	AM	20	18	1	1	0	0	6	4	2	95	
31/01/2008	Thur	AM	10	10	0	0	0	0	5	4	2	100	
21/02/2008	Thur	AM	10	10	0	0	0	0	6	4	2	100	
05/03/2008	Wed	AM	20	16	4	0	0	0	6	4	2	100	
12/03/2008	Wed	AM	20	20	0	0	0	0	6	4	2	100	
16/04/2008	Wed	AM	19	17	2	0	0	0	5	4	2	100	
07/05/2008	Wed	AM	11	11	0	0	0	0	5	4	3	100	96
08/05/2008	Thur	AM	16	14	2	0	0	0	5	4	3	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
14/05/2008	Wed	AM	18	14	3	0	1	0	6	3	3	94	
15/05/2008	Thur	AM	13	10	2	0	0	1	5	4	3	92	
21/05/2008	Wed	AM	20	16	3	0	0	1	5	3	3	95	
04/06/2008	Wed	AM	20	17	1	0	2	0	5	4	4	90	96
19/06/2008	Thur	AM	17	14	2	0	1	0	5	4	4	94	
25/06/2008	Wed	AM	10	9	1	0	0	0	6	4	4	100	
02/07/2008	Wed	AM	16	13	3	0	0	0	6	4	4	100	
09/07/2008	Wed	AM	20	10	9	0	1	0	6	4	4	95	
17/09/2008	Wed	AM	10	10	0	0	0	0	6	4	4	100	
17/09/2008	Wed	AM	10	10	0	0	0	0	6	4	4	100	
24/09/2008	Wed	AM	18	15	0	1	2	0	5	4	4	83	
07/10/2008	Tue	AM	10	8	2	0	0	0	5	4	4	100	
15/10/2008	Wed	AM	20	16	2	2	0	0	4	3	4	90	
22/10/2008	Wed	AM	20	14	5	0	0	1	5	4	4	95	
05/11/2008	Wed	AM	10	10	0	0	0	0	5	4	4	100	
11/11/2008	Tue	AM	20	20	0	0	0	0	5	4	4	100	
18/11/2008	Tue	AM	20	20	0	0	0	0	5	4	4	100	
26/11/2008	Wed	AM	20	19	0	0	1	0	5	4	4	95	
03/12/2008	Wed	AM	15	15	0	0	0	0	4	5	4	100	

1-1 ENGAGEMENT SCALE DATA – CLAIRE

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	20	8	3	0	4	5	4	3	1	55	76
02/10/2007	Tue	PM	20	19	1	0	0	0	6	4	1	100	
10/10/2007	Wed	AM	17	2	9	0	6	0	6	4	1	65	
11/10/2007	Thur	AM	20	16	1	0	3	0	6	3	1	85	
11/10/2007	Thur	AM	13	7	3	0	3	0	6	3	1	77	
14/11/2007	Wed	AM	20	15	1	0	2	2	4	4	2	80	93
05/12/2007	Wed	AM	20	11	6	0	3	0	6	3	2	85	
11/12/2007	Tue	PM	20	18	2	0	0	0	6	4	2	100	
23/01/2008	Wed	AM	20	18	2	0	0	0	6	4	2	100	
31/01/2008	Thur	AM	10	7	3	0	0	0	5	4	2	100	
21/02/2008	Thur	AM	12	9	3	0	0	0	6	4	2	100	
21/02/2008	Thur	AM	16	16	0	0	0	0	6	4	2	100	
05/03/2008	Wed	AM	18	14	0	0	0	0	6	4	2	78	
12/03/2008	Wed	AM	20	20	0	0	0	0	6	4	2	100	
16/04/2008	Wed	AM	20	15	0	0	0	0	6	4	2	75	
30/04/2008	Wed	AM	14	10	4	0	0	0	5	4	2	100	
07/05/2008	Wed	AM	17	14	3	0	0	0	5	4	3	100	98
08/05/2008	Thur	AM	20	16	4	0	0	0	5	4	3	100	
14/05/2008	Wed	AM	20	16	3	0	1	0	6	3	3	95	
14/05/2008	Wed	AM	14	12	2	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	20	16	4	0	0	0	5	3	3	100	
21/05/2008	Wed	AM	20	13	5	0	1	1	5	3	3	90	
11/06/2008	Wed	AM	17	17	0	0	0	0	5	4	4	100	100
19/06/2008	Thur	AM	18	18	0	0	0	0	5	4	4	100	
02/07/2008	Wed	AM	20	20	0	0	0	0	6	4	4	100	
09/07/2008	Wed	AM	20	18	2	0	0	0	6	4	4	100	
17/09/2008	Wed	AM	10	10	0	0	0	0	6	4	4	100	
24/09/2008	Wed	AM	24	23	1	0	0	0	5	4	4	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	4	100	
02/10/2008	Thur	AM	20	19	1	0	0	0	5	4	4	100	
07/10/2008	Tue	AM	10	7	3	0	0	0	5	4	4	100	
15/10/2008	Wed	AM	20	16	4	0	0	0	4	3	4	100	
15/10/2008	Wed	AM	16	11	5	0	0	0	4	3	4	100	
22/10/2008	Wed	AM	20	14	6	0	0	0	5	4	4	100	
05/11/2008	Wed	AM	10	10	0	0	0	0	5	4	4	100	
11/11/2008	Tue	AM	20	19	1	0	0	0	5	4	4	100	
18/11/2008	Tue	AM	20	17	2	0	0	1	5	4	4	95	
03/12/2008	Wed	AM	15	15	0	0	0	0	4	5	4	100	

1-1 ENGAGEMENT SCALE DATA – JANE

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	17	5	5	0	6	1	6	4	1	59	87
02/10/2007	Tue	PM	12	10	2	0	0	0	6	4	1	100	
09/10/2007	Tue	PM	20	12	6	0	2	0	5	4	1	90	
11/10/2007	Thur	AM	18	13	5	0	0	0	6	3	1	100	
31/10/2007	Wed	AM	20	15	2	0	2	1	6	4	1	85	
14/11/2007	Wed	AM	10	7	3	0	0	0	4	4	2	100	99
05/12/2007	Wed	AM	20	13	7	0	0	0	6	3	2	100	
05/12/2007	Wed	AM	10	10	0	0	0	0	6	3	2	100	
11/12/2007	Tue	PM	17	14	2	0	0	1	6	4	2	94	
06/02/2008	Wed	AM	20	13	7	0	0	0	6	4	2	100	
21/02/2008	Thur	AM	10	10	0	0	0	0	5	4	2	100	
05/03/2008	Wed	AM	11	9	2	0	0	0	6	4	2	100	
12/03/2008	Wed	AM	20	19	0	1	0	0	6	4	2	95	
16/04/2008	Wed	AM	15	15	0	0	0	0	5	4	2	100	
30/04/2008	Wed	AM	10	7	3	0	0	0	5	4	2	100	
07/05/2008	Wed	AM	19	17	2	0	0	0	5	4	3	100	100
08/05/2008	Thur	AM	20	10	10	0	0	0	5	4	3	100	
14/05/2008	Wed	AM	20	17	3	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	20	18	2	0	0	0	5	3	3	100	
15/05/2008	Thur	AM	20	17	3	0	0	0	5	3	3	100	
04/06/2008	Wed	AM	13	12	1	0	0	0	6	4	4	100	100
11/06/2008	Wed	AM	15	13	2	0	0	0	5	4	4	100	
19/06/2008	Thur	AM	12	12	0	0	0	0	5	4	4	100	
02/07/2008	Wed	AM	13	13	0	0	0	0	5	4	4	100	
09/07/2008	Wed	AM	20	20	0	0	0	0	6	4	4	100	
17/09/2008	Wed	AM	11	9	2	0	0	0	6	4	4	100	
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	4	100	
02/10/2008	Thur	AM	10	10	0	0	0	0	5	4	4	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
07/10/2008	Tue	AM	10	9	1	0	0	0	5	4	4	100	
11/11/2008	Tue	AM	20	19	1	0	0	0	6	5	4	100	
18/11/2008	Tue	AM	17	17	0	0	0	0	5	4	4	100	

1-1 ENGAGEMENT SCALE DATA – JOSHUA

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	10	8	2	0	0	0	6	4	1	100	100
11/10/2007	Thur	AM	10	10	0	0	0	0	6	3	1	100	
11/10/2007	Thur	AM	20	10	10	0	0	0	6	3	1	100	
15/10/2007	Mon	PM	20	18	2	0	0	0	3	3	1	100	
31/10/2007	Wed	AM	20	16	4	0	0	0	6	4	1	100	
05/12/2007	Wed	AM	10	10	0	0	0	0	6	3	2	100	100
05/12/2007	Wed	AM	20	19	0	0	1	0	6	3	2	95	
11/12/2007	Tue	PM	20	15	5	0	0	0	6	4	2	100	
23/01/2008	Wed	AM	20	20	0	0	0	0	6	4	2	100	
23/01/2008	Wed	AM	20	17	3	0	0	0	6	4	2	100	
31/01/2008	Thur	AM	10	9	1	0	0	0	5	4	2	100	
21/02/2008	Thur	AM	15	15	0	0	0	0	6	4	2	100	
05/03/2008	Wed	AM	15	12	3	0	0	0	6	4	2	100	
12/03/2008	Wed	AM	20	13	7	0	0	0	6	4	2	100	
30/04/2008	Wed	AM	10	8	2	0	0	0	5	4	2	100	
07/05/2008	Wed	AM	10	8	2	0	0	0	5	4	3	100	99
08/05/2008	Thur	AM	15	9	5	0	0	1	5	4	3	93	
14/05/2008	Wed	AM	20	19	1	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	15	13	2	0	0	0	5	3	3	100	
21/05/2008	Wed	AM	23	17	6	0	0	0	5	3	3	100	
04/06/2008	Wed	AM	14	11	3	0	0	0	5	4	4	100	99
11/06/2008	Wed	AM	14	13	1	0	0	0	5	4	4	100	
19/06/2008	Thur	AM	13	8	5	0	0	0	5	4	4	100	
02/07/2008	Wed	AM	12	10	2	0	0	0	6	4	4	100	
17/09/2008	Wed	AM	11	10	0	0	1	0	6	4	4	91	
24/09/2008	Wed	AM	10	10	0	0	0	0	4	4	4	100	
02/10/2008	Thur	AM	20	15	5	0	0	0	5	4	4	100	
02/10/2008	Thur	AM	10	9	1	0	0	0	5	4	4	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
15/10/2008	Wed	AM	16	15	1	0	0	0	4	3	4	100	
05/11/2008	Wed	AM	10	10	0	0	0	0	5	4	4	100	
11/11/2008	Tue	AM	18	17	0	0	0	1	6	5	4	94	
03/12/2008	Wed	AM	14	14	0	0	0	0	4	5	4	100	

1-1 ENGAGEMENT SCALE DATA – WILLIAM

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	20	17	0	3	0	2	6	4	1	85	96
26/09/2007	Wed	AM	20	12	8	0	0	0	6	4	1	100	
09/10/2007	Tue	PM	12	12	0	0	0	0	5	3	1	100	
09/10/2007	Tue	PM	20	17	2	0	1	0	5	3	1	95	
11/10/2007	Thur	AM	10	10	0	0	0	0	6	3	1	100	
11/10/2007	Thur	AM	20	14	0	6	0	0	6	3	1	70	
14/11/2007	Wed	AM	10	9	1	0	0	0	4	4	2	100	95
05/12/2007	Wed	AM	20	16	0	2	2	0	6	3	2	80	
05/12/2007	Wed	AM	20	19	1	0	0	0	6	3	2	100	
11/12/2007	Tue	PM	20	17	3	0	0	0	6	4	2	100	
23/01/2008	Tue	AM	20	20	0	0	0	0	6	4	2	100	
21/02/2008	Thur	AM	15	15	0	0	0	0	6	4	2	100	
21/02/2008	Thur	AM	14	12	0	2	0	0	5	4	2	86	
05/03/2008	Wed	AM	15	13	2	0	0	0	6	4	2	100	
12/03/2008	Wed	AM	20	11	6	3	0	0	6	4	2	85	
12/03/2008	Wed	AM	20	15	5	0	0	0	6	4	2	100	
07/05/2008	Wed	AM	20	19	1	0	0	0	6	4	3	100	98
08/05/2008	Thur	AM	20	16	2	1	0	1	5	4	3	90	
14/05/2008	Wed	AM	20	17	3	0	0	0	6	3	3	100	
14/05/2008	Wed	AM	13	10	3	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	20	16	3	1	0	0	5	4	3	95	
21/05/2008	Wed	AM	20	20	0	0	0	0	5	3	3	100	
04/06/2008	Wed	AM	20	20	0	0	0	0	6	4	4	100	100
11/06/2008	Wed	AM	20	18	2	0	0	0	5	4	4	100	
19/06/2008	Thur	AM	20	20	0	0	0	0	5	4	4	100	
02/07/2008	Wed	AM	20	18	1	0	1	0	5	4	4	95	
09/07/2008	Wed	AM	20	19	1	0	0	0	6	4	4	100	
17/09/2008	Wed	AM	11	8	3	0	0	0	6	4	4	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
24/09/2008	Wed	AM	20	19	1	0	0	0	5	4	4	100	
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	4	100	
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	4	100	
07/10/2008	Tue	AM	12	10	2	0	0	0	5	4	4	100	
22/10/2008	Wed	AM	13	11	2	0	0	0	5	4	4	100	
05/11/2008	Wed	AM	20	20	0	0	0	0	5	4	4	100	
11/11/2008	Tue	AM	20	19	1	0	0	0	6	5	4	100	
18/11/2008	Tue	AM	20	20	0	0	0	0	5	4	4	100	
03/12/2008	Wed	AM	18	18	0	0	0	0	4	5	4	100	

1-1 ENGAGEMENT SCALE DATA – LIAM

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	12	6	2	0	4	0	4	3	1	67	83
02/10/2007	Tue	PM	13	3	10	0	0	0	6	4	1	100	
10/10/2007	Wed	AM	20	7	7	0	6	0	6	4	1	70	
11/10/2007	Thur	AM	10	3	5	0	1	1	6	3	1	80	
16/10/2007	Tue	PM	10	2	8	0	0	0	5	3	1	100	
14/11/2007	Wed	AM	10	7	1	0	2	0	4	4	2	80	90
05/12/2007	Wed	AM	10	10	0	0	0	0	6	3	2	100	
05/12/2007	Wed	AM	20	13	3	0	4	0	6	3	2	80	
05/12/2007	Wed	AM	20	11	7	0	0	2	6	3	2	90	
11/12/2007	Tue	PM	20	16	1	0	3	0	6	4	2	85	
21/02/2008	Thur	AM	10	8	2	0	0	0	5	4	2	100	
05/03/2008	Wed	AM	13	11	2	0	0	0	6	4	2	100	
12/03/2008	Wed	AM	20	15	3	0	2	0	6	4	2	90	
30/04/2008	Wed	AM	11	5	4	0	2	0	5	4	2	82	
07/05/2008	Wed	AM	17	14	3	0	0	0	5	4	3	100	97
15/05/2008	Thur	AM	20	8	12	0	0	0	6	4	3	100	
15/05/2008	Thur	AM	17	12	4	0	1	0	5	3	3	94	
21/05/2008	Wed	AM	20	16	4	0	0	0	5	3	3	100	
21/05/2008	Wed	AM	10	4	5	0	1	0	5	3	3	90	
04/06/2008	Wed	AM	20	12	6	0	2	0	6	4	4	90	95
11/06/2008	Wed	AM	15	10	5	0	0	0	5	4	4	100	
19/06/2008	Thur	AM	16	8	6	0	2	0	5	4	4	88	
25/06/2008	Wed	AM	10	9	1	0	0	0	6	4	4	100	
02/07/2008	Wed	AM	20	13	6	0	1	0	6	4	4	95	
09/07/2008	Wed	AM	20	11	6	0	3	0	6	4	4	85	
17/09/2008	Wed	AM	10	9	0	0	1	0	6	4	4	90	
24/09/2008	Wed	AM	22	19	3	0	0	0	6	4	4	100	
02/10/2008	Thur	AM	20	15	4	0	1	0	5	4	4	95	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
02/10/2008	Thur	AM	10	8	2	0	0	0	5	4	4	100	
15/10/2008	Wed	AM	20	12	7	0	1	0	4	3	4	95	
22/10/2008	Wed	AM	17	8	9	0	0	0	5	4	4	100	
05/11/2008	Wed	AM	16	14	1	0	1	0	5	4	4	94	
11/11/2008	Tue	AM	20	12	8	0	0	0	6	5	4	100	
26/11/2008	Wed	AM	20	16	4	0	0	0	5	4	4	100	

APPENDIX 9.2

INDEPENDENT WORK ENGAGEMENT SCALE DATA

Stage Key	
Stage 1	Old Workstation
Stage 2	New Workstation
Stage 3	Old Workstation, New Chairs
Stage 4	New Workstation, New Chairs
Stage 5	Old Workstation, New Chairs, New Flooring
Stage 6	New Workstation, New Chairs, New Flooring

INDEPENDENT WORK ENGAGEMENT SCALE DATA - SIMON

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	10	8	0	0	0	2	6	4	1	80	84
19/09/2007	Wed	AM	20	18	0	0	1	1	6	4	1	90	
02/10/2007	Tue	PM	19	13	0	0	1	5	6	4	1	68	
02/10/2007	Tue	PM	20	16	1	0	1	2	6	4	1	85	
11/10/2007	Thur	AM	20	17	1	0	2	0	5	3	1	90	
11/10/2007	Thur	AM	19	11	2	0	4	2	5	3	1	68	
15/10/2007	Mon	PM	10	8	0	0	2	0	3	3	1	80	
15/10/2007	Mon	PM	20	15	0	0	4	1	3	3	1	75	
17/10/2007	Wed	AM	10	10	0	0	0	0	4	3	1	100	
17/10/2007	Wed	AM	20	18	2	0	0	0	4	3	1	100	
14/11/2007	Wed	AM	12	12	0	0	0	0	4	4	2	100	95
27/11/2007	Tue	PM	10	10	0	0	0	0	5	3	2	100	
05/12/2007	Wed	AM	13	13	0	0	0	0	5	3	2	100	
11/12/2007	Tue	PM	10	10	0	0	0	0	6	4	2	100	
23/01/2008	Wed	AM	10	6	0	0	3	1	6	4	2	60	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
31/01/2008	Thur	AM	10	10	0	0	0	0	6	4	2	100	
06/02/2008	Wed	AM	17	16	1	0	0	0	6	4	2	100	
06/02/2008	Wed	AM	10	10	0	0	0	0	6	4	2	100	
21/02/2008	Thur	AM	15	14	0	0	1	0	6	4	2	93	
27/02/2008	Wed	AM	10	10	0	0	0	0	6	4	2	100	
14/05/2008	Wed	AM	14	14	0	0	0	0	6	3	4	100	100
15/05/2008	Thur	AM	11	10	1	0	0	0	5	3	4	100	
15/05/2008	Thur	AM	10	10	0	0	0	0	6	4	4	100	
21/05/2008	Wed	AM	12	12	0	0	0	0	5	3	4	100	
21/05/2008	Wed	AM	10	10	0	0	0	0	5	3	4	100	
04/06/2008	Wed	AM	16	16	0	0	0	0	6	4	6	100	100
04/06/2008	Wed	AM	18	18	0	0	0	0	6	4	6	100	
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	6	100	
11/06/2008	Wed	AM	14	14	0	0	0	0	5	4	6	100	
19/06/2008	Thur	AM	10	10	0	0	0	0	6	4	6	100	
02/07/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	98
02/07/2008	Wed	AM	20	18	1	0	0	1	5	4	5	95	
09/07/2008	Wed	AM	17	17	0	0	0	0	6	4	5	100	
09/07/2008	Wed	AM	11	11	0	0	0	0	6	4	5	100	
17/09/2008	Wed	AM	12	10	1	0	1	0	6	4	5	92	
17/09/2008	Wed	AM	11	11	0	0	0	0	6	4	5	100	
24/09/2008	Wed	AM	14	14	0	0	0	0	6	4	5	100	
24/09/2008	Wed	AM	12	12	0	0	0	0	6	4	5	100	
07/10/2008	Tue	AM	16	16	0	0	0	0	6	4	5	100	
22/10/2008	Wed	AM	10	9	0	0	0	1	5	4	5	90	
22/10/2008	Wed	AM	10	10	0	0	0	0	5	4	5	100	
05/11/2008	Wed	AM	10	9	0	0	0	1	6	4	5	90	
05/11/2008	Wed	AM	13	13	0	0	0	0	6	4	5	100	
11/11/2008	Tue	AM	12	12	0	0	0	0	6	5	5	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
18/11/2008	Tue	AM	13	13	0	0	0	0	5	4	5	100	
26/11/2008	Wed	AM	12	12	0	0	0	0	5	4	5	100	
26/11/2008	Wed	AM	10	9	0	0	1	0	5	4	5	90	
03/12/2008	Wed	AM	8	8	0	0	0	0	6	5	5	100	
10/12/2008	Wed	AM	20	20	0	0	0	0	6	5	5	100	

INDEPENDENT WORK ENGAGEMENT SCALE DATA - CLAIRE

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	20	16	4	0	0	0	6	4	1	100	99
02/10/2007	Tue	PM	20	17	2	0	1	0	6	3	1	95	
10/10/2007	Wed	AM	19	16	3	0	0	0	6	4	1	100	
11/10/2007	Thur	AM	20	19	1	0	0	0	6	3	1	100	
31/10/2007	Wed	AM	20	19	1	0	0	0	5	4	1	100	
14/11/2007	Wed	AM	20	20	0	0	0	0	4	4	1	100	
27/11/2007	Tue	PM	19	19	0	0	0	0	3	3	1	100	
11/12/2007	Tue	PM	20	18	1	0	1	0	6	4	1	95	
23/01/2008	Wed	AM	20	19	1	0	0	0	6	4	1	100	
23/01/2008	Wed	AM	20	17	2	0	1	0	6	4	1	95	
14/05/2008	Wed	AM	20	20	0	0	0	0	6	3	3	100	100
14/05/2008	Wed	AM	20	20	0	0	0	0	6	3	3	100	
14/05/2008	Wed	AM	14	14	0	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	20	20	0	0	0	0	6	4	3	100	
21/05/2008	Wed	AM	20	20	0	0	0	0	5	3	3	100	
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	98
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	10	10	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	20	19	0	0	0	1	5	4	5	95	
19/06/2008	Thur	AM	20	18	1	0	1	0	6	4	5	95	
02/07/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	99
02/07/2008	Wed	AM	16	16	0	0	0	0	5	4	6	100	
09/07/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	
09/07/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	
17/09/2008	Wed	AM	20	19	0	0	1	0	6	4	6	95	
17/09/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	
17/09/2008	Wed	AM	10	10	0	0	0	0	6	4	6	100	
24/09/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
24/09/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	6	100	
07/10/2008	Tue	AM	14	14	0	0	0	0	6	4	6	100	
22/10/2008	Wed	AM	18	18	0	0	0	0	5	4	6	100	
22/10/2008	Wed	AM	20	20	0	0	0	0	5	4	6	100	
05/11/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	
05/11/2008	Wed	AM	20	20	0	0	0	0	6	4	6	100	
11/11/2008	Tue	AM	20	20	0	0	0	0	6	5	6	100	
18/11/2008	Tue	AM	20	19	0	0	1	0	5	4	6	95	
26/11/2008	Wed	AM	20	19	0	0	1	0	5	4	6	95	
03/12/2008	Wed	AM	20	20	0	0	0	0	6	5	6	100	
10/12/2008	Wed	AM	17	17	0	0	0	0	6	5	6	100	

INDEPENDENT WORK ENGAGEMENT SCALE DATA - JANE

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
26/09/2007	Wed	AM	10	9	1	0	0	0	6	4	1	100	97
10/10/2007	Wed	AM	15	14	1	0	0	0	6	4	1	100	
10/10/2007	Wed	AM	20	18	0	0	2	0	6	4	1	90	
11/10/2007	Thur	AM	13	13	0	0	0	0	5	3	1	100	
16/10/2007	Tue	PM	20	18	1	0	1	0	5	3	1	95	
17/10/2007	Wed	AM	18	18	0	0	0	0	4	3	1	100	
27/11/2007	Tue	PM	20	20	0	0	0	0	3	3	1	100	
11/12/2007	Tue	PM	20	16	0	0	3	1	6	4	1	80	
23/01/2008	Wed	AM	20	19	1	0	0	0	6	4	1	100	
23/01/2008	Wed	AM	20	19	1	0	0	0	6	4	1	100	
08/05/2008	Thur	AM	20	20	0	0	0	0	6	4	3	100	100
08/05/2008	Thur	AM	20	19	1	0	0	0	6	4	3	100	
14/05/2008	Wed	AM	20	20	0	0	0	0	6	3	3	100	
14/05/2008	Wed	AM	10	10	0	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	15	15	0	0	0	0	6	4	3	100	
04/06/2008	Wed	AM	20	19	1	0	0	0	6	4	5	100	100
04/06/2008	Wed	AM	19	19	0	0	0	0	6	4	5	100	
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
19/06/2008	Thur	AM	18	18	0	0	0	0	6	4	5	100	
25/06/2008	Wed	AM	15	15	0	0	0	0	6	4	5	100	
02/07/2008	Wed	AM	20	20	0	0	0	0	6	4	5	100	
02/07/2008	Wed	AM	18	18	0	0	0	0	6	4	5	100	
09/07/2008	Wed	AM	20	20	0	0	0	0	6	4	5	100	
09/07/2008	Wed	AM	19	19	0	0	0	0	6	4	5	100	
17/09/2008	Wed	AM	17	17	0	0	0	0	6	4	5	100	
17/09/2008	Wed	AM	17	17	0	0	0	0	6	4	5	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
24/09/2008	Wed	AM	15	15	0	0	0	0	6	4	5	100	
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	5	100	
02/10/2008	Thur	AM	14	14	0	0	0	0	5	4	5	100	
07/10/2008	Tue	AM	14	14	0	0	0	0	6	4	5	100	
22/10/2008	Wed	AM	17	17	0	0	0	0	5	4	5	100	
05/11/2008	Wed	AM	11	11	0	0	0	0	6	4	5	100	
05/11/2008	Wed	AM	14	14	0	0	0	0	6	4	5	100	
11/11/2008	Tue	AM	20	20	0	0	0	0	6	5	5	100	
18/11/2008	Tue	AM	18	18	0	0	0	0	5	4	5	100	
26/11/2008	Wed	AM	19	19	0	0	0	0	5	4	5	100	
03/12/2008	Wed	AM	18	18	0	0	0	0	6	5	5	100	
10/12/2008	Wed	AM	19	19	0	0	0	0	6	5	5	100	

INDEPENDENT WORK ENGAGEMENT SCALE DATA - JOSHUA

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
09/10/2007	Tue	PM	20	13	3	0	3	1	5	3	1	80	81
09/10/2007	Tue	PM	20	14	0	0	3	3	5	3	1	70	
11/10/2007	Thur	AM	20	14	2	0	1	3	6	3	1	80	
11/10/2007	Thur	AM	20	9	3	0	1	7	6	3	1	60	
17/10/2007	Wed	AM	16	14	1	0	1	0	4	3	1	94	
17/10/2007	Wed	AM	20	18	0	0	1	1	4	3	1	90	
05/12/2007	Wed	AM	13	13	0	0	0	0	5	3	1	100	
05/12/2007	Wed	AM	20	14	0	0	5	1	6	3	1	70	
23/01/2008	Wed	AM	10	10	0	0	0	0	6	4	1	100	
23/01/2008	Wed	AM	20	12	2	0	5	1	6	4	1	70	
16/04/2008	Wed	AM	20	17	0	0	0	3	5	4	2	85	86
16/04/2008	Wed	AM	18	15	1	0	0	2	4	4	2	89	
30/04/2008	Wed	AM	20	18	0	0	0	2	5	4	2	90	
30/04/2008	Wed	AM	20	15	2	0	1	2	5	4	2	85	
30/04/2008	Wed	AM	20	14	2	0	2	2	6	4	2	80	
30/04/2008	Wed	AM	20	13	5	0	0	2	6	4	2	90	
07/05/2008	Wed	AM	20	20	0	0	0	0	5	4	4	100	98
07/05/2008	Wed	AM	20	19	0	0	0	1	6	4	4	95	
07/05/2008	Wed	AM	10	10	0	0	0	0	6	4	4	100	
08/05/2008	Thur	AM	20	19	1	0	0	0	6	4	4	100	
08/05/2008	Thur	AM	20	19	0	0	0	1	6	4	4	95	
14/05/2008	Wed	AM	18	18	0	0	0	0	6	3	3	100	93
15/05/2008	Thur	AM	20	18	0	0	0	2	5	3	3	90	
15/05/2008	Thur	AM	15	14	1	0	0	0	6	4	3	100	
21/05/2008	Wed	AM	20	13	2	0	0	5	5	3	3	75	
21/05/2008	Wed	AM	20	20	0	0	0	0	5	3	3	100	
04/06/2008	Wed	AM	20	13	1	0	1	5	6	4	5	70	90
04/06/2008	Wed	AM	20	18	1	0	0	1	6	4	5	95	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	14	14	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	20	18	0	0	1	1	5	4	5	90	
19/06/2008	Thur	AM	16	15	0	0	1	0	6	4	5	94	
25/06/2008	Wed	AM	15	14	0	0	0	1	6	4	5	93	
02/07/2008	Wed	AM	20	18	1	0	1	0	6	4	5	95	
09/07/2008	Wed	AM	20	15	0	0	3	2	6	4	5	75	
17/09/2008	Wed	AM	17	15	0	0	2	0	6	4	5	88	
17/09/2008	Wed	AM	14	14	0	0	0	0	6	4	5	100	
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	5	100	
02/10/2008	Thur	AM	14	13	0	0	0	1	5	4	5	93	
22/10/2008	Wed	AM	20	18	0	0	2	0	5	4	5	90	
05/11/2008	Wed	AM	11	10	0	0	1	0	6	4	5	91	
11/11/2008	Tue	AM	20	17	0	0	3	0	6	5	5	85	
18/11/2008	Tue	AM	20	18	0	0	2	0	5	4	5	90	
18/11/2008	Tue	AM	11	10	0	0	1	0	5	4	5	91	
03/12/2008	Wed	AM	20	16	1	0	3	0	6	5	5	85	
10/12/2008	Wed	AM	20	17	0	0	3	0	6	5	5	85	

INDEPENDENT WORK ENGAGEMENT SCALE DATA - WILLIAM

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
26/09/2007	Wed	AM	20	20	0	0	0	0	6	4	1	100	98
11/10/2007	Thur	AM	20	20	0	0	0	0	5	3	1	100	
11/10/2007	Thur	AM	20	19	1	0	0	0	6	3	1	100	
17/10/2007	Wed	AM	20	19	0	0	0	1	4	3	1	95	
17/10/2007	Wed	AM	17	16	0	0	0	1	4	3	1	94	
27/11/2007	Tue	PM	16	16	0	0	0	0	5	3	1	100	
05/12/2007	Wed	AM	18	18	0	0	0	0	6	3	1	100	
11/12/2007	Tue	PM	17	17	0	0	0	0	6	4	1	100	
23/01/2008	Wed	AM	20	19	1	0	0	0	6	4	1	100	
23/01/2008	Wed	AM	20	19	0	0	1	0	6	4	1	95	
08/05/2008	Thur	AM	20	20	0	0	0	0	6	4	3	100	99
08/05/2008	Thur	AM	20	19	0	0	0	1	6	4	3	95	
14/05/2008	Wed	AM	10	10	0	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	20	20	0	0	0	0	5	3	3	100	
15/05/2008	Thur	AM	13	13	0	0	0	0	6	4	3	100	
21/05/2008	Wed	AM	16	16	0	0	0	0	5	3	3	100	
04/06/2008	Wed	AM	19	19	0	0	0	0	6	4	5	100	100
04/06/2008	Wed	AM	14	14	0	0	0	0	6	4	5	100	
11/06/2008	Wed	AM	18	18	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
19/06/2008	Thur	AM	14	14	0	0	0	0	6	4	5	100	
02/07/2008	Wed	AM	20	20	0	0	0	0	6	4	5	100	
02/07/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
09/07/2008	Wed	AM	20	20	0	0	0	0	6	4	5	100	
17/09/2008	Wed	AM	18	18	0	0	0	0	6	4	5	100	
17/09/2008	Wed	AM	18	18	0	0	0	0	6	4	5	100	
24/09/2008	Wed	AM	13	13	0	0	0	0	6	4	5	100	
24/09/2008	Wed	AM	20	20	0	0	0	0	6	4	5	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
02/10/2008	Thur	AM	20	20	0	0	0	0	5	4	5	100	
02/10/2008	Thur	AM	17	17	0	0	0	0	5	4	5	100	
07/10/2008	Tue	AM	10	10	0	0	0	0	6	4	5	100	
22/10/2008	Wed	AM	16	16	0	0	0	0	5	4	5	100	
22/10/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
05/11/2008	Wed	AM	11	11	0	0	0	0	6	4	5	100	
05/11/2008	Wed	AM	20	20	0	0	0	0	6	4	5	100	
11/11/2008	Tue	AM	20	20	0	0	0	0	6	5	5	100	
18/11/2008	Tue	AM	14	14	0	0	0	0	5	4	5	100	
26/11/2008	Wed	AM	20	20	0	0	0	0	5	4	5	100	
03/12/2008	Wed	AM	10	10	0	0	0	0	6	5	5	100	
10/12/2008	Wed	AM	18	18	0	0	0	0	6	5	5	100	

INDEPENDENT WORK ENGAGEMENT SCALE DATA - LIAM

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
19/09/2007	Wed	AM	11	8	0	0	3	0	6	4	1	73	92
10/10/2007	Wed	AM	13	11	0	0	2	0	4	3	1	85	
11/10/2007	Thur	AM	12	10	0	0	2	0	6	3	1	83	
15/10/2007	Mon	PM	10	10	0	0	0	0	3	3	1	100	
17/10/2007	Wed	AM	10	10	0	0	0	0	4	3	1	100	
27/11/2007	Tue	PM	12	12	0	0	0	0	3	3	1	100	
05/12/2007	Wed	AM	10	10	0	0	0	0	5	3	1	100	
11/12/2007	Tue	PM	12	10	0	0	1	1	6	4	1	83	
23/01/2008	Wed	AM	13	12	0	0	1	0	6	4	1	92	
23/01/2008	Wed	AM	12	12	0	0	0	0	6	4	1	100	
14/05/2008	Wed	AM	11	10	1	0	0	0	6	3	3	100	100
14/05/2008	Wed	AM	15	15	0	0	0	0	6	3	3	100	
15/05/2008	Thur	AM	11	11	0	0	0	0	5	3	3	100	
15/05/2008	Thur	AM	10	10	0	0	0	0	6	4	3	100	
21/05/2008	Wed	AM	12	12	0	0	0	0	5	3	3	100	
21/05/2008	Wed	AM	10	9	1	0	0	0	5	3	3	100	
04/06/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	99
04/06/2008	Wed	AM	12	12	0	0	0	0	6	4	5	100	
11/06/2008	Wed	AM	12	12	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	9	9	0	0	0	0	5	4	5	100	
11/06/2008	Wed	AM	10	10	0	0	0	0	5	4	5	100	
19/06/2008	Thur	AM	17	16	0	0	1	0	6	4	5	94	
25/06/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	
02/07/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	
02/07/2008	Wed	AM	10	9	0	0	1	0	5	4	5	90	
09/07/2008	Wed	AM	13	13	0	0	0	0	6	4	5	100	
09/07/2008	Wed	AM	13	13	0	0	0	0	6	4	5	100	
17/09/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	No. Child	No. Adult	Stage	% Engage	Mean %
24/09/2008	Wed	AM	8	8	0	0	0	0	6	4	5	100	
24/09/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	
02/10/2008	Thur	AM	10	10	0	0	0	0	5	4	5	100	
02/10/2008	Thur	AM	15	15	0	0	0	0	5	4	5	100	
07/10/2008	Tue	AM	9	9	0	0	0	0	6	4	5	100	
22/10/2008	Wed	AM	10	10	0	0	0	0	5	4	5	100	
22/10/2008	Wed	AM	11	11	0	0	0	0	5	4	5	100	
05/11/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	
05/11/2008	Wed	AM	10	10	0	0	0	0	6	4	5	100	
11/11/2008	Tue	AM	10	10	0	0	0	0	6	5	5	100	
26/11/2008	Wed	AM	10	10	0	0	0	0	5	4	5	100	
03/12/2008	Wed	AM	12	12	0	0	0	0	6	5	5	100	
10/12/2008	Wed	AM	10	10	0	0	0	0	6	5	5	100	

APPENDIX 9.3

GROUP ENGAGEMENT SCALE DATA

STAGE 1 – OLD TABLE

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
26/09/2007	Wed	AM	114	14	17	2	62	19	0	Circle	6	4	27	57	49	70
26/09/2007	Wed	AM	95	18	15	1	51	10	0	Game	5	4	35			
02/10/2007	Tue	PM	100	41	22	5	23	9	0	Circle	5	4	63			
09/10/2007	Tue	PM	100	33	23	4	38	3	0	Circle	5	3	56			
09/10/2007	Tue	PM	50	23	27	0	0	0	0	Game	5	3	100			
10/10/2007	Wed	AM	120	17	32	1	59	11	0	Circle	6	4	41			
10/10/2007	Wed	AM	48	10	20	8	9	1	0	Story	4	3	63			
11/10/2007	Thur	AM	100	16	34	0	50	0	0	Circle	5	3	50			
11/10/2007	Thur	AM	50	9	28	0	12	1	0	Game	5	3	74			
15/10/2007	Mon	PM	100	24	19	0	39	1	17	Circle	5	3	52			
16/10/2007	Tue	PM	100	20	42	1	19	4	4	Circle	5	3	65			
17/10/2007	Wed	AM	70	20	10	0	36	4	0	Circle	5	3	43			
31/10/2007	Wed	AM	65	10	18	0	32	4	1	Circle	5	4	44			
31/10/2007	Wed	AM	40	0	32	0	4	3	0	Game	5	4	80			

STAGE 2 – NEW TABLE

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
14/11/2007	Wed	AM	68	20	40	0	5	3	0	Circle	4	4	88	68	63	74
27/11/2007	Tue	PM	30	14	12	0	3	1	0	Circle	3	3	87			
27/11/2007	Tue	PM	60	36	21	0	3	0	0	Game	3	3	95			
05/12/2007	Wed	AM	78	28	24	0	8	4	14	Circle	6	3	81			
11/12/2007	Tue	PM	120	24	33	1	36	25	0	Circle	6	4	48			

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
11/12/2007	Tue	PM	120	22	47	3	35	13	0	Game	6	4	58			
23/01/2008	Wed	AM	120	22	41	3	51	4	0	Circle	6	4	53			
06/02/2008	Wed	AM	72	10	32	0	30	0	0	Game	6	4	58			
21/02/2008	Thur	AM	96	19	22	0	50	5	0	Circle	6	4	43			
21/02/2008	Thur	AM	120	26	72	0	19	3	0	Game	6	4	82			
27/02/2008	Wed	AM	78	17	31	0	25	5	0	Circle	6	4	62			
27/02/2008	Wed	AM	48	10	27	0	7	4	0	Game	6	4	77			
05/03/2008	Wed	AM	66	16	23	0	21	2	4	Circle	6	4	63			
05/03/2008	Wed	AM	54	9	39	0	4	2	0	Game	6	4	89			
12/03/2008	Wed	AM	96	18	39	0	28	11	0	Circle	6	4	59			
12/03/2008	Wed	AM	60	10	28	1	14	7	0	Game	6	4	63			
16/04/2008	Wed	AM	80	16	17	2	32	4	9	Circle	4	4	46			
30/04/2008	Wed	AM	105	14	60	1	22	8	0	Book	5	4	70			
30/04/2008	Wed	AM	80	24	26	0	23	7	0	Circle	5	4	63			

STAGE 3 – NEW CHAIRS

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
07/05/2008	Wed	AM	85	37	24	0	13	3	8	Circle	5	4	79	71	68	79
08/05/2008	Thur	AM	60	10	43	0	6	1	0	Game	6	4	88			
08/05/2008	Thur	AM	84	17	37	0	28	2	0	Circle	6	4	64			
14/05/2008	Wed	AM	120	29	45	0	44	2	0	Circle	6	3	62			
14/05/2008	Wed	AM	84	19	39	0	26	0	0	Book	6	3	69			
21/05/2008	Wed	AM	55	16	20	0	18	1	0	Circle	5	3	65			

STAGE 4 – NEW FLOORING

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
04/06/2008	Wed	AM	78	15	32	0	31	0	0	Circle	6	4	60	74	67	82
04/06/2008	Wed	AM	120	20	60	0	38	2	0	Game	6	4	67			
11/06/2008	Wed	AM	55	10	38	0	7	0	0	Game	5	4	87			
11/06/2008	Wed	AM	70	15	20	0	27	2	6	Circle	5	4	55			
19/06/2008	Thur	AM	78	20	35	0	23	0	0	Circle	6	4	71			
02/07/2008	Wed	AM	90	16	51	0	23	0	0	Book	5	4	74			
02/07/2008	Wed	AM	60	20	22	0	16	2	0	Circle	5	4	70			
09/07/2008	Wed	AM	78	22	31	0	10	2	13	Circle	6	4	82			
09/07/2008	Wed	AM	72	14	34	0	0	0	24	Game	6	4	100			

STAGE 5 – IWB

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
17/09/2008	Wed	AM	90	24	47	0	19	0	0	Circle	6	4	79	85	82	87
17/09/2008	Wed	AM	66	30	33	0	3	0	0	Game	6	4	95			
24/09/2008	Wed	AM	66	15	32	2	6	0	11	Circle	6	4	85			
24/09/2008	Wed	AM	84	18	50	2	5	4	5	Game	6	4	86			
02/10/2008	Thur	AM	80	21	50	0	9	0	0	Circle	5	4	89			
02/10/2008	Thur	AM	50	8	37	0	2	3	0	Game	5	4	90			
02/10/2008	Thur	AM	100	41	48	0	11	0	0	Game	5	5	89			
07/10/2008	Tue	AM	120	28	66	0	21	5	0	Circle	6	4	78			
07/10/2008	Tue	AM	120	49	47	0	22	2	0	Game	6	4	80			
15/10/2008	Wed	AM	80	25	40	0	12	3	0	Game	4	3	81			
22/10/2008	Wed	AM	105	91	3	4	4	3	0	Game	5	4	90			
22/10/2008	Wed	AM	80	20	40	0	19	1	0	Circle	5	4	75			
05/11/2008	Wed	AM	120	86	26	0	8	0	0	Game	6	4	93			
11/11/2008	Tue	AM	84	21	51	0	12	0	0	Circle	6	5	86			

Date	Day	Time	Total	Active	Passive	Ritual	P-Non	A-Non	Out Of Sight	Activity	No. Child	No. Adult	% Engage	All	Circle	Games
11/11/2008	Tue	AM	108	17	70	1	20	0	0	Game	6	5	81			
18/11/2008	Tue	AM	96	26	59	0	11	0	0	Circle	6	5	89			
18/11/2008	Tue	AM	54	9	24	1	11	1	8	Game	6	5	72			
26/11/2008	Wed	AM	85	16	62	0	3	4	0	Game	5	4	92			
26/11/2008	Wed	AM	100	24	60	0	11	5	0	Circle	5	4	84			
03/12/2008	Wed	AM	66	16	33	0	17	0	0	Circle	6	5	74			
03/12/2008	Wed	AM	120	26	77	0	8	0	9	Game	6	5	93			
10/12/2008	Wed	AM	78	23	40	0	14	1	0	Circle	6	5	81			
10/12/2008	Wed	AM	102	24	57	0	10	2	9	Game	6	5	87			

APPENDIX 9.4

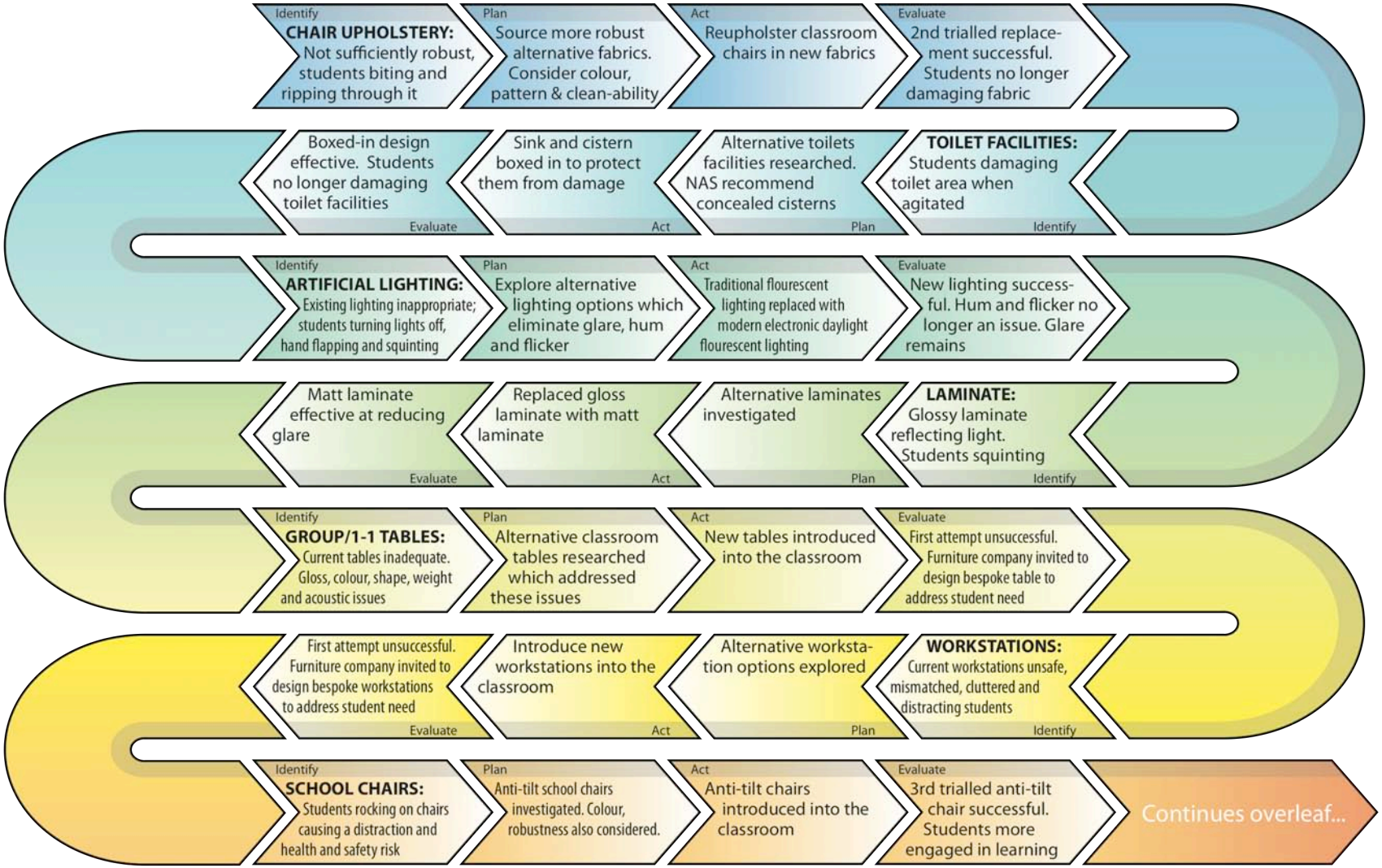
CHOICE TIME ENGAGEMENT SCALE

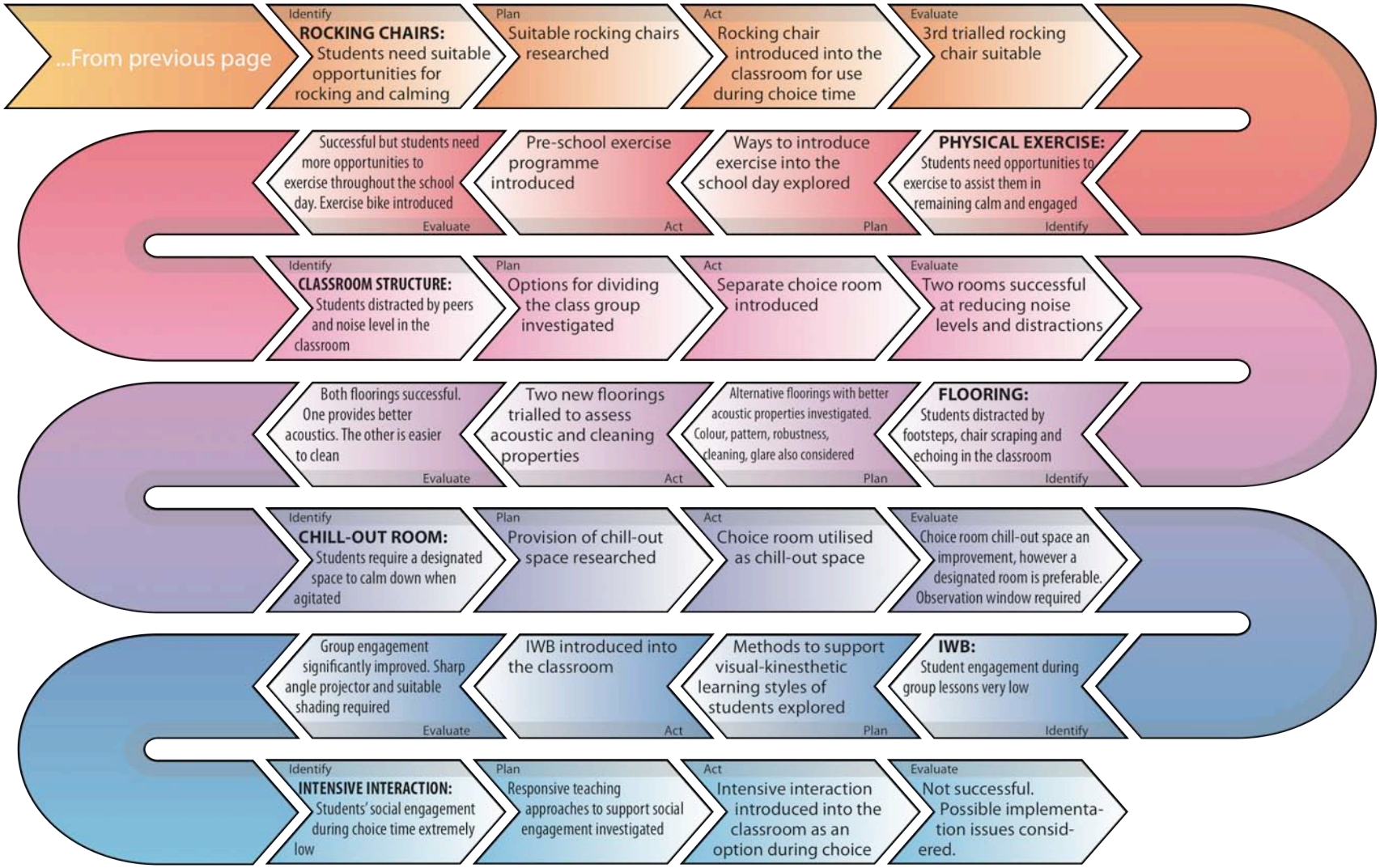
Code Key	
Code 1	Prior to Intensive Interaction
Code 2	After Intensive Interaction

Date	Day	Time	Total	Auth. Pers.	Auth. Mat.	Ritual	Non-E	Out Of Sight	No. Child	No. Adults	Code	% Auth. Pers.	% Auth. Mat.	% Ritual	% Non-E
26/09/2007	Wed	AM	120	0	45	20	55	0	6	4	1	0	38	17	46
26/09/2007	Wed	AM	120	0	45	16	59	0	6	4	1	0	38	13	49
02/10/2007	Tue	PM	120	3	65	31	21	0	6	4	1	3	54	26	18
02/10/2007	Tue	PM	120	4	58	27	28	4	6	4	1	3	50	23	24
02/10/2007	Tue	PM	120	0	65	17	35	3	6	4	1	0	56	15	30
02/10/2007	Tue	PM	120	0	88	4	27	1	6	4	1	0	74	3	23
09/10/2007	Tue	PM	100	2	44	19	31	4	5	3	1	2	46	20	32
09/10/2007	Tue	PM	100	0	60	15	18	7	5	3	1	0	65	16	19
10/10/2007	Wed	AM	120	2	55	22	41	0	6	4	1	2	46	18	34
10/10/2007	Wed	AM	120	0	62	4	31	23	6	4	1	0	64	4	32
10/10/2007	Wed	AM	100	5	51	0	14	30	5	3	1	7	73	0	20
10/10/2007	Wed	AM	100	2	77	7	2	12	5	4	1	2	88	8	2
11/10/2007	Thur	AM	120	1	43	21	47	8	6	3	1	1	38	19	42
11/10/2007	Thur	AM	100	2	51	15	31	1	5	3	1	2	52	15	31
11/10/2007	Thur	AM	120	1	43	21	47	8	6	3	1	1	38	19	42
16/10/2007	Tue	PM	100	7	66	13	16	0	5	3	1	7	66	13	16
16/10/2007	Tue	PM	100	13	44	20	23	0	5	3	1	13	44	20	23
17/10/2007	Wed	AM	80	4	26	10	22	18	4	3	1	6	42	16	35
17/10/2007	Wed	AM	100	6	32	6	51	5	5	3	1	6	34	6	54
14/11/2007	Wed	AM	60	14	7	7	25	7	4	4	1	26	13	13	47
27/11/2007	Tue	PM	65	0	34	2	29	0	5	3	1	0	52	3	45
27/11/2007	Tue	PM	30	0	15	0	9	6	3	3	1	0	63	0	38

Date	Day	Time	Total	Auth. Pers.	Auth. Mat.	Ritual	Non-E	Out Of Sight	No. Child	No. Adults	Code	% Auth. Pers.	% Auth. Mat.	% Ritual	% Non-E
05/12/2007	Wed	AM	120	0	52	33	33	2	6	3	1	0	44	28	28
11/12/2007	Tue	PM	120	1	74	30	13	2	6	4	1	1	63	25	11
16/04/2008	Wed	AM	100	0	38	3	23	36	5	4	2	0	59	5	36
30/04/2008	Wed	AM	60	0	13	18	29	0	5	4	2	0	22	30	48
30/04/2008	Wed	AM	120	2	53	31	32	2	6	4	2	2	45	26	27
07/05/2008	Wed	AM	75	3	20	16	26	10	5	4	2	5	31	25	40
07/05/2008	Wed	AM	84	4	52	18	10	0	6	4	2	5	62	21	12
08/05/2008	Thur	AM	72	4	31	12	14	11	6	4	2	7	51	20	23
08/05/2008	Thur	AM	100	0	37	20	21	22	5	4	2	0	47	26	27
08/05/2008	Thur	AM	60	2	43	6	9	0	5	4	2	3	72	10	15
14/05/2008	Wed	AM	120	9	33	20	46	12	6	3	2	8	31	19	43
15/05/2008	Thur	AM	100	3	37	35	25	0	5	3	2	3	37	35	25
21/05/2008	Wed	AM	65	0	42	5	18	0	5	3	2	0	65	8	28
21/05/2008	Wed	AM	120	20	60	0	20	20	6	4	2	20	60	0	20
11/06/2008	Wed	AM	100	3	52	0	25	20	5	4	2	4	65	0	31
11/06/2008	Wed	AM	50	2	23	7	11	7	5	4	2	5	53	16	26
19/06/2008	Thur	AM	120	0	53	21	26	20	6	4	2	0	53	21	26
02/07/2008	Wed	AM	50	15	18	6	11	0	5	4	2	30	36	12	22
09/07/2008	Wed	AM	84	1	30	22	18	13	6	4	2	1	42	31	25
09/07/2008	Wed	AM	84	3	53	14	12	2	6	4	2	4	65	17	15

APPENDIX 10 - PAR SPIRAL




...From previous page
Identify
ROCKING CHAIRS:
Students need suitable opportunities for rocking and calming
Plan
Suitable rocking chairs researched
Act
Rocking chair introduced into the classroom for use during choice time
Evaluate
3rd trialled rocking chair suitable
Identify
PHYSICAL EXERCISE:
Students need opportunities to exercise to assist them in remaining calm and engaged
Plan
Ways to introduce exercise into the school day explored
Act
Pre-school exercise programme introduced
Evaluate
Successful but students need more opportunities to exercise throughout the school day. Exercise bike introduced
Identify
CLASSROOM STRUCTURE:
Students distracted by peers and noise level in the classroom
Plan
Options for dividing the class group investigated
Act
Separate choice room introduced
Evaluate
Two rooms successful at reducing noise levels and distractions
Identify
FLOORING:
Students distracted by footsteps, chair scraping and echoing in the classroom
Plan
Alternative floorings with better acoustic properties investigated. Colour, pattern, robustness, cleaning, glare also considered
Act
Two new floorings trialled to assess acoustic and cleaning properties
Evaluate
Both floorings successful. One provides better acoustics. The other is easier to clean
Identify
CHILL-OUT ROOM:
Students require a designated space to calm down when agitated
Plan
Provision of chill-out space researched
Act
Choice room utilised as chill-out space
Evaluate
Choice room chill-out space an improvement, however a designated room is preferable. Observation window required
Identify
IWB:
Student engagement during group lessons very low
Plan
Methods to support visual-kinesthetic learning styles of students explored
Act
IWB introduced into the classroom
Evaluate
Group engagement significantly improved. Sharp angle projector and suitable shading required
Identify
INTENSIVE INTERACTION:
Students' social engagement during choice time extremely low
Plan
Responsive teaching approaches to support social engagement investigated
Act
Intensive interaction introduced into the classroom as an option during choice
Evaluate
Not successful. Possible implementation issues considered.

APPENDIX 11

OVERVIEW OF THEORETICAL MODEL DEVELOPMENT

Classroom Modification	Theoretical Areas Addressed
Chair Upholstery	▪ Sensory Processing Difficulties ▪ Interoceptive Dysfunction (Toileting) ▪ Challenging Behaviour / Harsh Use
Toileting Facilities	▪ Sensory Processing Difficulties ▪ Interoceptive Dysfunction (Toileting) ▪ Challenging Behaviour / Harsh Use ▪ Stereotypical behaviours ▪ Lack of Sense of Danger ▪ Independence
Artificial Lighting	▪ Sensory Processing Difficulties ▪ Stereotypical behaviours
Laminate	▪ Sensory Processing Difficulties
Rocking Chairs	▪ Sensory Processing Difficulties ▪ Sensory Regulatory Difficulties ▪ Interoceptive Dysfunction (Toileting) ▪ Challenging Behaviour / Harsh Use ▪ Lack of Sense of Danger ▪ Individual Need
Physical Exercise	▪ Sensory Regulatory Difficulties ▪ Independence
Group / 1:1 Table	▪ Sensory Processing Difficulties ▪ Challenging Behaviour / Harsh Use ▪ Individual Need ▪ Staffing Requirements
Independent workstations	▪ Sensory Processing Difficulties ▪ Challenging Behaviour / Harsh Use ▪ Individual Need ▪ Teaching Approach
School Chairs	▪ Sensory Processing Difficulties ▪ Sensory Regulatory Difficulties ▪ Challenging Behaviour / Harsh Use
Classroom Structure	▪ Sensory Processing Difficulties ▪ Learning Styles & Needs ▪ Social Impairments ▪ Staffing Requirements
Flooring	▪ Sensory Processing Difficulties ▪ Teaching Approach ▪ Challenging Behaviour / Harsh Use ▪ Interoceptive Dysfunction (Toileting)
Chill-out Room	▪ Sensory Processing Difficulties ▪ Challenging Behaviour / Harsh Use
Classroom Size	▪ Sensory Processing Difficulties ▪ Challenging Behaviour ▪ Teaching Approach
Room Temperature	▪ Interoceptive Dysfunction (Temperature Regulation)
Sunlight	▪ Sensory Processing Difficulties

Classroom Modification	Theoretical Areas Addressed
Window Views	▪ Sensory Processing Difficulties
Natural Light	▪ Sensory Processing Difficulties
Ventilation	▪ Interoceptive Dysfunction (Temperature Regulation) ▪ Stereotypical behaviours
Screens	▪ Sensory Processing Difficulties ▪ Challenging Behaviours / Harsh Use
Storage	▪ Sensory Processing Difficulties
Computer Storage	▪ Sensory Processing Difficulties ▪ Challenging Behaviour / Harsh Use ▪ Stereotypical Behaviours ▪ Independence
Kitchen Areas	▪ Stereotypical Behaviours ▪ Independence
Sensory Integration Equipment	▪ Sensory Processing Difficulties ▪ Sensory Regulatory Difficulties ▪ Independence
'Circulation Space' Corridors	▪ Sensory Processing Difficulties ▪ Challenging Behaviour
Walls	▪ Sensory Processing Difficulties
Security & Safety	▪ Lack of Sense of Danger
Acoustics	▪ Sensory Processing Difficulties