ARCHITECTIRAL FORM AS MITIGATING FACTOR FOR AUTISM SPETRUM DISORDER IN CHILDREN: REHABILITATION CENTRE FOR AUTISTIC CHILDREN.

BY

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DECLARATION

I declare that the work in the thesis entitled ARCHITECTURAL FORM AS MITIGATING FACTOR FOR AUTISM SPECTRUM DISORDER IN CHILDREN: REHABILITATION CENTRE FOR AUTISM SPECTRUM DISORDER has been performed by me in the Department of Architecture under the supervision of Arc. A. S. Salisu and Arc M. H. Mukhtar.

The information derived from the literature has duly been acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree or diploma at any university or institution.

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Name of student	Signature	Date

CERTIFICATION

This thesis entitled ARCHITECTURAL FORM AS MITIGATING FACTOR FOR AUTISM SPECTRUM DISORDER IN CHILDREN: REHABILITATION CENTRE FOR AUTISM SPECTRUM DISORDER, KADUNA by MAHMOOD, Hajara Abubakar meets the regulations governing the award of the degree of Master of Science of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literary presentation.

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DEDICATION

This project is dedicated to Almighty ALLAH S.W.T., the almighty and the all knower, the beneficent, the merciful, the giver of wisdom, knowledge and understanding.

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ABSTRACT

Autism Spectrum Disorder (ASD) which can be termed as a lifelong complex development disorder usually affecting children. It's relatively new but rapidly growing in developing countries. Thus there is need for rehabilitation centre to cater for parents affected by Autism. This dissertation explores the application of forms and colours as a mitigating factor towards treatment and rehabilitation of patients suffering from Autism. Methodology employed was the case study of five existing ASD rehabilitation centers both local and international with a view of ascertaining the shortcomings or otherwise. Interviews were also conducted with staff, parents, administrators and patients. The data so obtained were summarized, analyzed as it relates to enhancing the use of architectural forms and colours in the design of the rehabilitation centre. The proposed project will include a school, specifically tailored towards the need of the children in terms of special requirements of building forms (curvilinear walls), light, sound, colour, and the landscape of the environment. the result revealed that colour and curvilinear form unlike the regular edge form aid in the healing process of the patients. Recommendation that could enhance and guarantee a most conducive atmosphere that will aid the healing process, quality of life of the ASD patients were suggested.

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CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF STUDY

Most infants and young children are very social creatures who need and want contact with others to thrive and grow. They smile, cuddle, laugh and respond eagerly to games like “peek-a-boo” or hide-and-seek. Occasionally, however, a child does not interact in this expected manner. Instead, the child seems to exist in his or her own world, a place characterized by repetitive routines, odd and peculiar behaviors, problems in communication, and a total lack of social awareness or interest in others. These are characteristics of a developmental disorder called autism (the child, 2008).

The severity of autism varies widely, from mild to severe. Some children are very bright and do well in school, although they have problems with school adjustment. They may be able to live independently when they grow up. Other children with autism function at a much lower level. Mental retardation is commonly associated with autism.

Children with autism need a comprehensive evaluation and specialized behavioral and educational programs. Some children with autism may also benefit from treatment with medication. Child and adolescent psychiatrists are trained to diagnose autism, and to help families design and implement an appropriate treatment plan. They can also help families cope with the stress which may be associated with having a child with autism.

Although there is no cure for autism, appropriate specialized treatment provided early in life can have a positive impact on the child’s development and produce an overall reduction in disruptive behaviors and symptoms.

An estimated 600 million of the world's population live with some form of impairment, with 83% surviving on less than a dollar per day. Of this figure, a staggering 80% live in developing countries. According to a recent survey carried out by the world health organization (2001), an estimated 10% of any given population are persons with disabilities. In Nigerian terms, this translates into 14million people out of a population of more than 140million people (2006 National Census figures). With high incidences of poliomyelitis, ethnic clashes and limited access to health care, this may however be an under-estimate. A more realistic projection of 12% is stated by the Ojile report (Ojile, 1992) of which 92% are estimated to be living with severe poverty. (Mohammad, 2010)

Many children in Nigeria with autism are either not diagnosed or misdiagnosed. They either end up being hidden at home or "lucky" to be clubbed with the deaf, dumb or mentally retarded children**.** In rural areas where there are no psychiatric hospitals, majority end up on the streets as insane fellows.

Various government, philanthropist organization and individuals have a lot of varying perception of what a rehabilitation scheme ought to have, provide and take. Some look at it as a vocational institution, some give emphasis on health while others suggests education. All these views have relevance in rehabilitation Programme. However, it most be noted that a common mistake would be providing these facilities in isolation.

Rehabilitation serves as a reliable instrument towards instilling self-sufficiency in people living with physical disabilities. Rehabilitation generally refers to any programme, exercise or guidance, afforded those with a particular disability, be it physical, mental or social. It is geared towards providing therapy and/or training, to aid in instilling or the restitution of positive skills

and attitudes in a person. This is with the aim of providing him or her, a more contributory and fulfilling role in the society.

Rehabilitation addresses the rehabilitees' physical, psychological and environmental needs. It is achieved by restoring physical functions, or modifying the rehabilitees' physical and social environment. Orlando (1996) states in his column on rehabilitation for minors that, a proper rehabilitation program can reverse most disabling conditions or help rehabilitees cope with deficits that cannot be reversed.

Rehabilitation, in itself, is a concept which developed countries are moving away from. Strategies have been developed for early intervention, via specialized medical care, special schools, and integration with regular schools during childhood. With developing countries like Nigeria, attempts at re-integration and preparation for economic independence have to take a remedial path, in form of rehabilitation, as early intervention has been on a minimal scale. (Mohammad, 2010)

Today, treatment is aimed not only at the removal of symptoms, but also at the provision of facilities which will enable the patient once again to develop his relationship with the environment.

1.2 STATEMENT OF PROBLEM

The situation of autism in Nigeria is so pathetic that the society and government are saying "Autistic Children are hopeless economic liabilities and you must be blind, deaf or physical handicapped to deserve any support". There is no recognition of autism as a disability and nothing; absolutely nothing is available to meet the needs of those with the condition. Even the federal ministry of Education does not categorize autism as a distinct disability despite the fact

that the condition is currently reputed as 3rd most common childhood disorders and fastest growing developmental disability. Many of the so called "mad" persons on Nigerian streets are recoverable persons with autism who were neither diagnosed nor treated. Yet they could have been treated. They could have been our Temple Grandin, Tony DeBlois or Ping Lean (Martins, 2007)

It is ironical that no educational institution in the country offers specialized training in the diagnosis and treatment of autism or environment purposely made to accommodate autistic children. Not even in any of the many departments of Psychology or special education in our Universities. Students learn about autism but only in passing, a skeletal mention. Nearly all children with autism have challenges that require professional interventions by a speech /language pathologist. So far there is an estimated 190,000 children needing such therapy all over the nation. This figure is expected to grow in non distant future, according to research (martins, 2007).

Therefore, creating environment to cater for needs of autistic children will help bring back live to these children and stop parents from locking up their children at home but make them realize their potentials.

1.3 AIM AND OBJECTIVES

The aim of this study is to design a building tailored to the needs of autistic children by create a conducive environment in terms of planning, physical architectural forms and the landscape that will encourage the reorganization of behavior and the restoration of a balanced personality. In order to realize the above aim, the following objectives shall be taken into consideration:

I. To assess the impact of the autism specific design on the children and

II. The extent to which adaptations in their environment can ameliorate the negative effects associated with Autism Spectrum Disorder (ASD).

By establishing Autism rehabilitation Center, the public would be made to accept and understand the special place and needs of persons with autism, which could stir up interest amongst relevant professionals and motivate them to research and update professional knowledge in the various aspects of ASD and parents could be made to bring forth their autistic children for rehabilitation.

1.4 JUSTIFICATION

This study is aimed at designing a building tailored to the needs of autistic children by create a conducive environment through the use of architectural form and designs in providing the enabling environment to realize the potentials of Autistic children, making them useful to their families and the society in general especially in Kaduna State and the neighboring environments.

1.5 METHOD OF STUDY

Population of study

The population under study consists of people with autism spectrum disorder in children age 4-18. Others include health and social workers, families of people with autism. Data is sourced randomly from amongst these groups

Sources of data

The study will employ among others: primary source of data. This will include interviews (administration of oral and written questionnaires) with professionals in relevant fields

regarding rehabilitation. These include medical doctors, nurses, social workers, psychologist, neurologist, psychiatrist, speech therapist, and other professionals like vocational tutors.

Carrying out case studies, and observing the target groups in similar environments, to determine problem areas, in order to evolve workable solutions in the project.

Secondary sources of data gathering including review of published texts, unpublished thesis will be conducted, existing literature in the form of books, journals, magazines and the Internet. Also graphics and photographic documentation will also be carried out on existing situation.

1.6 SCOPE OF WORK

The proposed rehabilitation centre is expected to provide facilities tailored to the needs of autistic children. These facilities will include: administrative facilities, accommodation for pupils, classrooms, halls, clinic, recreational facilities for both indoor and outdoor activities, Sensory gym, library, parking, garden, music, art and craft.

CHAPTER TWO: LITERATURE REVIEW

2.1 THE NATURE OF AUTISM

Autism is one of the most fascinating disorders to be studied by physicians, psychologists, mental health practitioners, therapists, and educators. This is evident from the relatively large body of research on the topic. Although researchers believe that individuals with autistic characteristics lived well before the twentieth century, the syndrome of Autism was first named and described by a psychiatrist, Kanner, in 1943. In his research, Kanner described eleven children whose condition was different from anything reported at that time. The children had certain characteristics in common which set them apart from others (Scheuermann, 2002; Groden and Baron, 1991). These included the following:

1) An inability to relate to others in an ordinary manner.
2) An extreme autistic aloneness that seemingly isolated the child from the outside world.
3) An apparent resistance to being picked up or held.
4) Deficits in language including mutism and echolalia.
5) In some cases, an excellent rote memory.
6) Early specific food preferences.
7) Extreme fear reactions to loud noises.
8) Obsessive desire for repetition and maintenance of sameness.
9) Few spontaneous activities such as typical play behavior.
10) Bizarre and repetitive physical movement such as spinning or perpetual rocking.
11) Normal physical appearance.



Plate: 2.1 An Autistic Child Playing

(Source: www.google.com)

2.2 HISTORICAL OVERVEW

Documented cases of autistic behavior have been identified as early as 1801, although the appellation "Autism" was not ascribed to this condition until 1943. Leo kanner, a child psychollis, utilized a series of symptomatic conditions to describe the characteristic of autism, most of which are still presently used (Eric and Gary 1986)

The first documented case is that of Itard (1801) in his description of victor, the wild boy of Aveyron, who was found wandering the forest of Aveyron, France. Itard assumed that the young boy was uneducated and untouched by societal influences; however, most of his behavioral characteristics are recognizable today as those of an autistic individual. Unfortunately, it was not until later that the full impact of these traits was recognized. This was

done by Kanner in the mid-twentieth century (Eric and Gary 1986) The autistic characteristics identified by Kanner were the inability to develop normal social relations, a delay in speech acquisition, a tendency for pronominal reversal when speech was acquired, and a marked lack of imagination but indications of a good rote memory, repetitive and stereotypical play activities and a demand for sameness to be maintained in the environment. Although autistic children developed these characteristics during infancy, they developed a normal physical appearance (Eric and Gary 1986). Kanner also noted that while some or all of these characteristics might appear in an autistic child, differences in intensity, as well as differing characteristics, resulted in each child representing a unique case.

Since 1943, others have expanded upon Kanner's body of work in areas of increased accuracy of diagnostic criterion and etiology. Among these contributors were Wing (1983) who created the differential of subgroups based upon the type of social problem demonstrated by the autistic child, and Goldfarb (1961) who began inquiry into assumptions of environmental causation (Eric and Gary 1986).

Autism does not have an extensive history. Individual cases are documented in much more depth since the turn of the century, but no consistency in evaluation and treatment has been instituted, although clinical methods have developed significantly in the past fifteen years.

2.3 CLASSIFICATION OF AUTISM

Children with autistic characteristics may be classified as having autism spectrum disorder, also known as pervasive developmental disorder (PDD). Pervasive developmental disorder includes several disorders such as autistic disorder, Asperger's syndrome, childhood disintegrative disorder, Rett's disorder, and pervasive developmental disorder not otherwise specified (PDD-NOS). But children who are diagnosed with any of these disorders exhibit the following

characteristics: “severe and pervasive impairment in several areas of development: reciprocal social interaction skills, communication skills, or the presence of stereotyped behavior, interests, and activities” (APA, 1994). These symptoms do not imply sickness, fragility, or emotional disturbance.

Below are definitions and characteristics of the five different autism disorders.

2.3.1 Classic Autism:

Autism is the second leading childhood developmental disorder and is considered the most severe of the different types of Autism disorders. People with Classic Autism develop language late, or not at all. People affected with Classic Autism have difficulties talking with other people or a profound lack of affection or emotional contact with others, an intense wish for sameness in routines, muteness or abnormality of speech, high levels of Visio-spatial skills, but major learning difficulties in other areas. Symptoms of autism usually appear during the first three years of childhood and continue throughout life.

2.3.2 Aspergers Syndrome:

A Person with Aspergers Syndrome can exhibit a variety of characteristics and the disorder can range from mild to severe. Children show deficiencies in social skill and have difficulties with transitions or changes. They compulsively cling to rituals and any changes in their routine can upset them. They have a great difficulty reading body language and determining proper body space. Some children with Aspergers Syndrome have reduced sensitivity to pain and an increased sensitivity to bright lights and loud noises. With this type of Autism disorders they also have average or above-average intelligence.

2.3.3 Rett Syndrome:

Rett syndrome is a neurological and developmental disorder that mostly occurs in females and is marked by poor head growth. Loss of muscle tone is usually the first symptom. Other early symptoms may include problems crawling or walking and diminished eye contact. They stop using their hands to do things and often develop stereotyped hand movements, such as wringing, clapping, or patting their hands. The inability to perform motor functions is perhaps the most severely disabling feature of Rett syndrome, interfering with every body movement, including eye gaze and speech. Infants with Rett syndrome seem to grow and develop normally at first, but then stop developing and even lose skills and abilities.

2.3.4 Childhood Disintegrative Disorder:

Childhood Disintegrative Disorder includes severe regression in communication skills, social behavior, and all developmental motor skills. At the beginning these children seem perfectly normal. They start to regress at between ages 2-4 years. At that time these children stop socializing, lose potty-training skills, stop playing, lose motor skills and stop making friends.

2.3.5 Pervasive Developmental Disorder-Not Otherwise Specified:

This tends to describe individuals who show patterns of the autistic syndrome but have a later age of onset than three years old, and/or only some of or less severe symptoms. Sometimes this is referred to as atypical autism.

2.4 CHARACTERISTICS OF AUTISM

The characteristics of autism are often categorized as either behavioral excesses or behavioral deficits. Behavioral excesses are characteristics that may get in the way of learning, cause the child to be punished, or make it difficult to deal with the child in normal situations

(Scheuermann & Webber, 2002). Therefore, it is a goal of therapy/education to eliminate these behaviors. Examples of behavioral excesses are aggression, self-abuse, and tantrums.

In addition, children with autism often do not have essential skills for living such as talking, dressing, and playing. Without these behaviors or abilities, the child is severely handicapped. These characteristics are called behavioral deficits and believed to be directly related to behavioral excesses (Scheuermann & Webber, 2002). In other words, the more skills or abilities that a child lacks the more likely it is that he/she will resort to behavioral excesses to communicate and function with others in the world.

2.4.1 Behavioral excesses

When children with autism lack the necessary skills to communicate their wants and needs, they often resort to other behaviors to make these known. Examples of these behavioral excesses follow.

2.4.2 Self-Stimulation

Often individuals with autism engage in self-stimulation. It is believed that the autistic individual craves sensory input and that these behaviors meet this need. Self-stimulation behaviors are usually repetitive and stereotypical in nature. Examples include: spinning and rocking themselves, hand flapping, humming in a monotone, arranging and rearranging objects, moving their hands between their eyes and a light to achieve a strobe effect, gazing up at the ceiling or lights, and smiling or laughing when there seems to be no stimulus. Self-stimulation

seems to be a preferred activity and the individual with autism may engage in one of these for long periods of time.

2.4.3 Resistance to Change

Due to the cognitive processing deficits mentioned above, children with autism may show aversion to change. Often new stimuli are difficult for this child to comprehend and he/she relies on rote memory to create understanding (Scheuermann and Webber, 2002). Therefore, change can cause frustration, confusion, and anxiety. The child then prefers to do things in a repetitive manner and to maintain a strict schedule to help him/her make sense of the world (Matson, 1994). If change must occur, the child with autism handles the change better when he/she has been previously prepared (Scheuermann and Webber, 2002). For example, if there is to be a field trip in the community on Friday, the students should rehearse what they are to do and know what is to be expected of them. Visual schedules and calendars should be highly visible to remind the students about the upcoming field trip.

2.4.4 Other Behaviors

Individuals may also engage in self-injurious behaviors. These may occur when the child is trying to communicate something or when he/she is experiencing fear, or undue stress or frustration. If the child is taught how to ask for what he or she needs appropriately then some of these behaviors may diminish. Self-injurious behaviors include: head banging, hair or hand biting, gouging their eyes, or hitting themselves (Matson, 1994). Individuals with autism may also engage in aggressive behaviors when there space is invaded or when experiencing frustration or stress. The child with autism may slap, hit, spit, scratch, or kick. Other behaviors

include pica (eating inappropriate objects), hyperactivity, impulsivity, short attention span, and tantrums (Scheuermann & Webber, 2002).

2.5 TREATMENT

As of the present date, the exact etiology of autism has yet to be found. However, much research has addressed the neurological (Minshew, Sweeney, & Bauman, 1997), neurochemical (Anderson & Hoshino, 1997), and genetic (Rutter, Bailey, Simonoff, & Pickles, 1997) abnormalities present in autism. Current treatment approaches are based on three main theories (Fisher et al., 1991; Scheuermann & Webber, 2002). The first theory, a perceptual/cognitive theory, is based on the premise that individuals with autism have differences in their thinking ability and the way they receive input. Those that adhere to this theory believe that the autistic child is over-stimulated by auditory, visual, and tactile stimuli. If the child cannot make sense of this overload of information, the child may withdraw. Therefore, treatment would include methods that would help the child make sense of his/her seemingly chaotic world. The environment would be uncluttered and organized in such a way as to give the child visual clues as to where he is to go and what he is to do. Highly organized and predictable visual schedules would be used to keep the child on task and directions would be given in brief short steps, including instructions on how to attend and communicate in socially appropriate ways.

2.6 AUTISM IN NIGERIA

In many parts of the world including some underdeveloped and developing societies, there seems to be an increasing concern and outcry over the rise in cases of autism spectrum disorders. These concerns have resulted to efforts ranging from the enactment of laws mandating early diagnosis and intervention; provision of free appropriate services and education

for children with autism; Acceptance and inclusion of such children in mainstream or regular schools; to training of special education and regular teachers on best practices in meeting the goals of the each child's Individualized Education Plan. Beginning in the United States in early 1940's thru 1960's till date to South Africa since mid 1960's, serious efforts have been made to recognize autism as a disability in its own class and to address its many challenges. In South Africa, this effort began during the 1960's when Dr Vera Buhrmam became aware of the extent of the problem of autism in Cape Town. A few years later, precisely in 1970, the first school for autistic learners opened in Cape Town. There are now about 5 such schools in South Africa.

The situation in Nigeria seems to be the same as in pre 1943 America when children with autism were thought to be schizophrenic, mentally retarded, and when maternal deprivation and spiritual causation held sway as explanations for etiology. The level of awareness about autism in Nigeria is pathetically low. There is a little bit of awareness amongst the medical community, but mostly to the extent that they know the symptoms and manifestations of "infantile autism". Majority do not know that autism spectrum disorders have forms (e.g regressive autism) some don't believe the condition is treatable and nearly 70% have no clue as to where to refer cases and or what to do even when sure about a diagnosis. We still have medical doctors who say that autism is rare, foreign and "Oyibo" wahala (white man's problem) (Martins, 2007). Many children in Nigeria with autism are either not diagnosed or misdiagnosed. They either end up being hidden at home or lucky to be clubbed with the deaf, dumb or mentally retarded children. In rural areas where there are no psychiatric hospitals, majority end up on the streets as insane fellows.

There had been attempts between late 1970's and 1980's by 2 parents Mrs. Blankson (Abuja) and Mrs. Chikelu (Lagos) to set up schools to cater for children with autistic like challenges. Of

course both of them were parents who returned from abroad and couldn't get services for their Children. As the case still is, lack of fund, and limited skills hindered both visions. A third and perhaps more successful attempt was made by another parent who upon return from abroad worked against all odds to set up a center for children with development challenges in Surulere Lagos. The center caters for persons with physical, mental and developmental disabilities and is still viable till date.

There is a serious and disheartening lack of awareness and misunderstanding about autism in Nigeria. Many special educators, psychologists and even medical doctors seem to be hearing the word autism for the first or poorly remembered second time!! Parents are often the most confused. Different doctors say different professional explanations of the same condition. Unlike in most countries, where a multi-disciplinary team assesses, diagnoses and develops individualized educational plans for each child with autism, what happens in Nigeria is far from that! Here, the children are hidden at home, especially if the special schools (centers for the deaf, blind or mentally retarded) rejected them or if the parents are rich and influential, they are placed in mainstream schools where the teachers are advised to keep promoting them form class to class as they grow chronologically. This is both frustrating for the teachers and the children (Autism, 2007).

The first experience with individualized one-on-one treatment for autism in Nigeria was in the year 2001 when Dr. Helen Nwanze began working with an American boy whose father was a Citi Bank Expatriate in Lagos. As Eddie made fantastic progress on the programme, more and more children were being referred to Dr. Helen Nwanze who eventually started an organisation called Acceleration Therapy. The organisation began to recruit and train therapists on the Autistic Spectrum Adapted Programme (ASAP). Mr. Williams Ekanem of Autism Associates

was among the first group of therapists to be trained on the Autistic Spectrum Adapted Programme (ASAP). The number of children grew from 1 to 7 in 2002.

In January 2007, a group of parents and professionals form Autism Associates, with a primary goal to campaign for early detection, appropriate diagnoses and intervention for ASD. Autism Associates is also assisting with the formation of CADD (Centre for Autism and Developmental Disabilities). CADD is committed to advocacy, research and training.

Almost all the autism specific service providers in Nigeria are based in Lagos. There are however, one group each in Abuja and another in Port Harcourt. Although majority of the children on the ASAP have made obvious and impressive progress, more can be achieved if more intervention perspectives are made available. Nigerian professionals, particularly the therapists working with autistic children, need training on evidence based practices such as the ABA, TEACCH, VERBAL BEHAVIOUR, PECS, RDI, etc. There is need for specialized services such as speech and occupational therapies. There is need to train the medical community and educate them on early detection and diagnosis of autism (Martins, 2007)

The legal framework necessary to support individuals with autism is another deficit area. The trend in most parts world is that 'No child should be left behind', 'Every disabled child matters', 'No exclusion', 'Free basic Education to all'. However, the situation in our country is so pathetic that you get the impression that society and government are saying 'Autistic Children are hopeless economic liabilities or you must be blind, deaf or physical handicapped to deserve any support' (Martins, 2007). There is no recognition of autism as a disability and nothing; absolutely nothing is available to meet the needs of those with the condition. Even the federal ministry of Education does not categorise autism as a distinct disability despite the fact that the condition is currently reputed as 3rd most common childhood disorders and fastest growing

developmental disability. Many of the so called 'mad' persons on Nigerian streets are recoverable persons with autism who were neither diagnosed nor treated. Yet they could have been treated. They could have been our Temple Grandin, Tony DeBlois or Ping Lean.

The worst hit are the millions of families in the rural areas where there is hardly any schools for typical children talk less of facilities for challenged ones. Exorcism is the common treatment and mothers are blamed for their children's autism. There is a lot of stigma and discrimination against disabled persons. In cities like Lagos where there is now a bit of autism literacy, the major problem is finance. Eighty percent of those we meet are poor and unable to afford or sustain the services. Because there is no welfare programme in Nigeria in terms of Government Funding for the educational and professional services needed by these children, the burden is on parents only! The few affluent ones prefer to send their children abroad. If they must reside in Nigeria, they prefer to hire an expert from South Africa, USA, UK and so on who would work with their children ALONE!! Often times the cost of brining in an expert would otherwise be more than sufficient to train 30 local therapists. Not wanting to be associated with child's disability, denial of the disability, selfishness, status assertion are some of the major challenges hindering the formation of a viable parent support group.

"An autistic child is not an imbecile neither is he or she just been naughty. It is not specific to any class, gender, race, religion or ethnic group, nor does it result from wrong parenting or lifestyle."Autism occurs more in males than females at a ratio of 4:1, accounting for about 11 per cent of global disease and is projected to reach 14.7 per cent by 2020, according to the World Health Organisation (WHO). (Martins, 2007)

Approximately, 67 million people worldwide are affected by autism, yet the condition is far from hopeless. “Autistic children have been known to become geniuses as adults with proper care, love and support.” It is all about engagement, to bring out the intelligence in them. We all must keep hope alive, say no to discrimination and stigmatisation of autistic children.”

2.7 RELATED DISORDERS

It is important to note the similarity in behaviors that may exist between autism and other disorders. Because of this overlap, many individuals who suffered from autism were originally inaccurately classified under other disorders, making evaluation and treatment difficult or ineffective. The following is a short listing of related disorders, and includes the respective similarities and differences from autism.

A. Childhood Schizophrenia-

Similarities:	**Differences:**
Sustained impairment of social relations,	Age of onset.
Resistance to change in the environment.	Family history of mental illness.
Speech abnormalities, and	Poor physical health.
Constricted or inappropriate affect.	Poor motor performance.
	Higher IQ,
	Periods of remission and relapse.
	Higher levels of language skills, and

Presence of delusions and hallucinations.

B. Developmental Aphasia-

Similarities:	**Differences:**
Echolalia,	Language deficits note as pronounced.
Pronominal reversal.	Engage in imaginative play.
Sequencing problems.	Usually normal intelligence.
Difficulties in comprehension, and	Exhibit emotional intentions, and
Secondary problems of social relations.	Meaningful communication through gesture.

C. Mental Retardation-

Similarities:	**Differences:**
Poor intellectual abilities,	Display appropriate social behavior.
Echolalia,	Willingness to communicate.
Self stimulatory behavior.	Abnormal physical development.
Self injurious behavior, and	Delayed motor abilities, and
Attentional deficits.	Wide ranging intellectual impairment.

D. Environmental Deprivation-

Similarities:	**Differences:**
Maternal deprivation,	Marked improvement in enriched environment.
Analytic depression.	Do not engage in repetitious, stereotypical play.
Hospitalism,	Do not exhibit echolalia.
Delayed motor skills development.	Do not exhibit pronominal reversal, and
Delayed speech development.	Do not avoid social contact.
Engage in unusual motor activity, and	
Show little interest in toys.	

2.9 AUTISM AND SELF INJURY

Autism and self injury has very little research. However, in a study on challenging behaviors in individuals with intellectual disabilities, self injury has been found to be connected to both receptive and expressive communication. Among individuals with autism, self injurious behavior incidence estimates a range from 20% to 71% depending, relatively, on the IQ and age range of the child. In young children with autism (4-5 years old), the frequency rate of self injurious behavior may be as high as 52%, based on parental reports. A number of studies have reported that individuals with autism who are also mentally retarded have higher levels of self injury than individuals

without mental retardation. In children with autism, lower levels of expressive meaningful language and more severe levels of communication, socialization and daily living skills domains are all associated with increased self injurious behaviors. Studies on autism have concluded that self injury in children with autism and individuals with developmental disabilities without autism to be notably similar. Self injurious behaviors can be seen as a class of behaviors, often highly repetitive and frequent, that result in physical harm to the individual displaying the behavior. Furthermore, such self injury occurs without an obvious purpose or intentional self harm. It is important to distinguish between behaviors, such as suicide, that are associated with deliberate wishes of self harm, and self injurious behavior found in individuals with developmental disabilities, which may occur in connection with biological causes or are more a result of environmental factors. Self injury found in autism is also often referred to as self mutilation, self destructive, or masochistic behaviors (gratification gained from physical pain). Self injurious behaviors are often placed on a category of repetitive stereotypes, and have been proposed to only differ in severity at the moment of injury. In fact, recent reviews of repetitive behaviors in autism place self injurious behavior within a wide range. Self injurious behaviors can range from severe, life threatening injuries to less directly damaging cases.

Some Autistic Self Injurious Behaviors

i. Head rubbing

ii. Occasional impact with surface when rocking or head-banging.

iii. Finger or arm sucking

iv. Frequent arm biting or self-biting

v. Nail picking

vi. Mouthing such as putting things in mouth or suck on an object.

vii. Bringing up partially digested food and re-chews before swallowing or spitting out.

viii. Thigh slapping

ix. Poking external openings in the body like eyes, nostrils, mouth, and ears.

x. Stuffing external openings of the body.

xi. Hair pulling

xii. Self-scratching

xiii. Self-pinching

xiv. Ingestion of air

xv. Ingestion of feces or playing with feces

xvi. Excessive fluid intake

For autistic children engaging in self injury the frequency and severity may vary as well as behaviors depending on individual circumstances and environmental demands. Therefore, a self injurious behavior that may be considered stereotyped may also appear as self injurious in a different situation. Social self injury in autism seems to occur more often in a social setting, is directly self aggressive, and associated with stereotyped behaviors and other behavior problems. To date no study has compared self injury in individuals with autism across the lifespan. Although it's unpredictable, as the child matures in age certain fixations depending on adaptive behavior skills, settings, symptoms of severity, and ability level self injurious behaviors may decrease.

Communication Difficulties with Autism and Self Injury

Children with autism may experience self injury because of their communication impairments. It has been proposed that self injury is a display of an abnormal and impaired need to communicate. Problematic behavior used as unpleasant forms of communication is developed to replace their lack of socially acceptable forms of verbal and nonverbal communication. Challenging uncontrolled verbal behavior is minor compared to serious self injuries. Instead of just attempting to decrease the challenging behavior through direct punishment or prescription treatment, attempts to teach socially appropriate forms of communication become crucial. Teaching communicative positive ways for escaping punishment can replace the challenging verbal behaviors used as a substitute for self injurious behaviors.

Autism Self Injury and Causes

Self injury in autism has numerous causes and theories trying to explain it. While most theories are a little more than untested assumptions, behavioral and neuro-chemical theories have been researched and validated. It is important to mention that attempts to explain the cause of self injurious behavior in autism has been strongly influenced by the helpful use of treatments. Determining whether autistic self injury is replacing a form of communication depends on careful analysis of the individual and consequences of the behavior. As well, the cause and persistence of the injury are seen more as provocation rather than environmental possibilities.

Autism Self Injury and Self-Stimulation Theory

A trigger to self injury in autism has been proposed as self stimulation theory which seems to occur without apparent environmental possibilities. In this case self injury is understood as being sustained by self induced stimulation of the senses, and helps strengthen both sensory and social development. Case studies and neuropsychological models have long supported the

notion that individuals with autism are characterized by a sensory impairment in adjustment, resulting in either under or oversensitivity to stimulation.

For individuals with autism self-injury is a form of self stimulation corresponds with the idea that repetitive, stereotyped movements (e.g. body-rocking, hand-flapping, spinning etc.) provide under aroused individuals with stimulation. One study shows that allowing individuals to replace the stimulating effects of self injury with more suitable behaviors decreases the problem behaviors. The limited studies suggest that among children with mental retardation, a diagnosis of autism is associated with a higher incidence of tantrums, aggression, and destruction of property. Most case studies attribute violence to impairment in theory of mind (a lack of understanding and inability to appreciate the victim's point of view), although this interpretation is controversial.

Treatment for Self Injury in Autism

For treatment and education of self injury and autism, applied behavior analysis (ABA) has become widely accepted as an effective treatment. Thirty years of research demonstrated the efficacy of applied behavioral methods in reducing inappropriate behavior and in increasing communication, learning, and appropriate social. ABA therapy created as a behavioral intensive management of one-on-one child-teacher interaction for 40 hours a week to help reinforce desirable behaviors and reduce undesirable ones.

Medication for self injurious behaviors in autism has been approved by the U.S. Food and Drug Administration (FDA). The use of one of the leading prescription antipsychotic medications, Risperdal (risperidone), for the treatment of irritability associated with autistic disorder, including symptoms of aggression, deliberate self-injury, temper tantrums, and quickly changing moods, in children and adolescents aged 5 to 16 years. This is the first time the FDA

has approved any medication for use in children and adolescents with autism. The dosage of Risperdal should be individualized for children and adolescents based on weight. The safety and effectiveness of Risperdal in pediatric patients with autistic disorder less than 5 years of age have not been established.

For self injury and autism the most effective treatment is most often acombination of medication, cognitive/behavioral therapy, and other treatment services as needed. Medication is often useful in the management of aggression, and thoughts of self injury. Behavioral therapy helps individuals control and decreases their injurious behaviors.

2.10 REHABILITATION

Rehabilitation is a term signifying any programmed ameliorative exercise guidance or instruction afforded those with a particular disability, whether physical, mental or social. Rehabilitation is generally synonymous with therapy, as sponsored by official or public programmes. In all cases, the purpose of rehabilitation is the instilling or restitution of positive skills or attitudes in a person. It aims at accessing the residual abilities in persons with disabilities, and accordingly fit them into suitable jobs or self-employed ventures through vocational and educational training. It also aims to help them cope effectively with their environment in order to function as independently as possible

CHAPTER THREE

ARCHITECTURAL APPROACH TO AUTISTIC CHILDREN'S NEEDS

3.1 INTRODUCTION

Today, environmental psychologists study how environments affect people and how they affect the people who use them. Principles of crowding, privacy, personal space, and environmental perception, and factors such as noise, temperature, air circulation, and cost all determine how a building is designed and how well it serves its function (Bonnie 2003).

3.2 CHILDREN'S NEEDS

3.2.1 EDUCATION

The goals of education, as pointed out by J.K. and Loraa Wing, are "to help the individual to live as full a life as possible, to equip him to earn his own living, and to turn him into a useful citizen. These goals are held in some form or another by most

educators of our day. Unfortunately, the results of educating children with autism have, until present, fallen quite short of these goals. Evidence of this can be seen in the increasing demand for autistic children's' homes, increases in home care programs, and in the continual pursuit of better educational methods for autistic people.

Mainstreaming persons with disabilities has become mandatory. Research has shown this to be an appropriate teaching approach, allowing the development of social skills through the availability of role models, and deinstitutionalized environments.

However, many schools are poorly equipped to handle the needs of these autistic individuals in their physical facilities and in the development of suitable curricula. Because of these inadequacies, autistic children obtain a substandard education.

Physical facilities can have a dramatic effect upon what occurs in any given building environment. Because of the result of frequent unthoughtful design programs, many limitations are being placed not only upon teachers but also upon the students in Educational facilities. These schools should be designed to meet the new ADA standards but because the needs have not been assessed with regard to autistic students, their implementation becomes difficult. Although research continues in the attempt to discover not only an etiology for this disability, but a cure as well, it becomes vastly important to provide autistic students with an environment and a curriculum that can help them become contributing factors in today's society.

Children with autism require more focus and direction than other children, involving a more intimate surrounding away from the city scene where they may feel pressured, inferior and lonely. The attention these children need can only be found at certain institutes which devote the efforts required for the natural development of these children. They should not feel like they are separate from the world around them, but more of an integral part of their community. Form, colors, space and light are all elements which make up architecture and affect autistic children differently throughout their development.

Past Educational Practices and Environments for Autistic Children

The education of autistic children received its foundation in the early years with the efforts of Itard in 1801. The child in question, although not labeled as autistic at the time, was cared for in an institutional setting by Itard and a number of other physicians. It was assumed that as the

child had remained relatively untouched by any societal influences, he was completely uneducated. Itard sought to remedy that. Although little was documented about the actual teaching techniques employed by Itard, the recovery of the child has been documented. It could be assumed that any educational success was not the product of any one particular program, but mainly due to the intense amount of staff time that had been devoted to the child. It should also be noted that although some recovery have been made by the child, the child retained many classical autistic behaviors throughout his life.

In 1943, Kanner's efforts for teaching those individuals with autism is the next documented. They occurred in an institutional setting, and again showed some positive results, assumed to result from the enormous amount of staff time spent with each individual.

In Karmer's research, the autistic children were dealt with as though the parents were at fault for their disability, and assumed that the children were retreating from a perceived hostile environment. These children were removed from their own home and placed in an institutional setting and taught by therapists acting as surrogate parents. Most treatment programs at this time were predicated upon this hypothesis, but this treatment form has shown little to result in actual value.

Secondary to these efforts were treatments that took place in the home. To a large depth, parents who were of a higher socio-economic status, and were in a better position to understand that their child was suffering from some disability, used the institution as their main resource. Children who were not of this group utilized home care programs, teaching the children themselves in lieu of institutionalization. Unfortunately, little is known about these early home programs.

These early teaching techniques were generally unhelpful to the autistic children, due in large part to the faulty etiology and environmental causes that were the basis of the treatment programs. Little progress was made through these early programs.

Educational Procedures and Environments Today

Based upon a growing amount of research of autism into etiology, treatment effects, and educational techniques for typical children, education for the autistic child has undergone major changes. These changes can be seen in all areas of care from residential treatment programs to parent education.

Due largely to the lack of government funding and trends toward deinstitutionalization, few facilities exist that deal exclusively with the teaching of autistic children.

Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) Program

With recent reports of major progress in the research and treatment of very young individuals with autism (Lovaas, 1987), a variety of preschool projects have been developed around the country. In their book, *Preschool Education Programs for Children with Autism*, Sandra L. Harris and Jan S. Handleman (1994) give an overview of several of these programs. One program of importance is the TEACCH program. It was founded by Eric in 1972 as a division of the Department of Psychiatry, University of North Carolina at Chapel Hill. Dedicated to improving the understanding and services for children with autism, TEACCH is a statewide, comprehensive, community based program in North Carolina.

A central aspect of this curriculum is structured teaching. Children in the preschool program are taught how to be students and the appropriate social and communicative behavior to be

successful in a regular classroom environment. The children work on fine and gross motor skills, self-help skills (such as toileting, eating habits, washing hands, wiping tables, hanging up coats), expressive communication, receptive language, and social interaction. They work individually, one on- one with a teacher or therapist, in small groups, and in larger groups. Individual daily schedules help to prevent frustration and behavior problems. The number of students to one teacher with an assistant should not exceed six. Emphasis is placed on the physical structure of the curriculum and the layout of the learning environment. Suggested teaching activities and strategies for parents and teachers are published in:

Individualized Assessment and Treatment for Autistic and Developmentally Disabled Children: Teaching Strategies for Parents and Professionals, Volume II (Schopler, Reichler, & Lansing, 1980) and Teaching Activities for Autistic Children, Volume III (Watson, Lord, Schaffer, & Schopler, 1988). Watson, Lord, Schaffer, & Schopler (1988) also produce a TEACCH communication curriculum that can be used both in school and at home (Haris and Handelman, 1994).

Structuring the environment and facilitating independence at all levels of functioning are the most important goals of this curriculum. Each child's behaviors, skills, and deficits are observed and assessed so that an individualized program can be designed for him/her.

A TEACCH consultant helps the teachers and other professionals understand the needs of the autistic child. While many skills can be taught directly, others require environmental accommodation. By accommodating the learning environment to the deficits associated with autism, independent functioning of each child is gradually increased and many frustrations and behavior problems are avoided (Lord and Schopler, in Harris and Handelman, 1994).

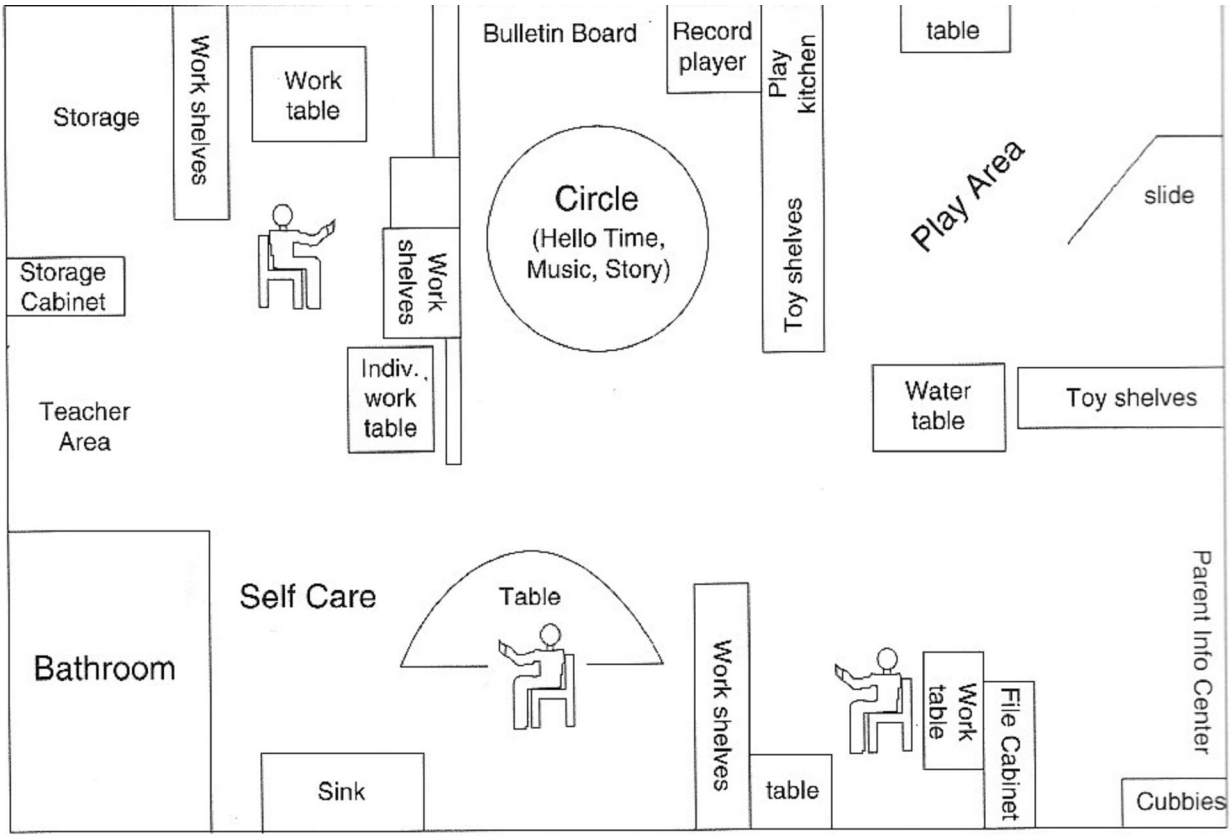


FIGURE 3.1: Example of Classroom Layout using TEACCH Curriculum.

(Source: Harris and Handleman, 1994)

There are numerous other treatments for various aspects of autistic disorder. For example, to address communication difficulties, a speech pathologist may suggest sign language, the picture exchange system, or an augmentative device. For auditory problems the therapist may suggest auditory integration training. To improve social interactions the therapist or special educator may use social stories, comic strip conversations, or social review. A medical intervention by a physician might be vitamin therapy.

Since the child with autism often has an excellent visual memory it is important to plan how information will be presented. It is difficult to unteach something once the child has learned it incorrectly. Material is presented in a sequential format from left to right or from top to bottom.

If the child is to perform a behavior or complete an activity the following three components must be included: (1) the child must be shown what he/she is to do, (2) how he/she is to do it, and (3) the child must be given a cue so that he/she will know when the activity is finished. It is also important to show a sample of the finished product. Often pictures are taken to show the child the steps in an activity and the order in which they are to be performed.

Often the professional or caregiver will rehearse the procedure with the child, giving cues at first, and then gradually giving fewer cues until no assistance is needed.

At the individual workstation, teacher-generated activities are left for the child to work on independently. The work station consists of a desk or study corral similar to that which is found in a library to eliminate distractions by others in the room. Materials are presented in a tray to the left of the desk. The child takes the work from the tray and works on it independently until the activity is complete. Then the child puts the completed activity in the tray on the right of the desk. The child may be expected to do more than one activity. This process continues until the child receives a cue that individual work time is over. The cue may be the ring of an egg timer or the soft ringing of a hand bell within the classroom. The child would then proceed to the next activity.

Each child knows where to go and what activity to perform next based on an individual schedule. The individual schedules are usually placed in a prominent place in the room and displayed at the child's height. When the child first arrives, he goes to the schedule and removes the first icon and performs that task until a bell rings softly to cue him that it is time to advance to the next activity. These icons are pictures that represent different activities during the day. For instance, an icon of the school bus could signal arrival or departure time. Children with

autism have difficulty with the abstract concept of time so they need concrete visual or auditory cues to notify them how long they should do something or when time is up.

Another visual technique is to put lines on the floor to indicate where the children should line up when moving from the classroom to activities outside the classroom. Again words such as "line up" are abstract and difficult for the child to understand. Sometimes each child is designated a color so that she can find her materials in the "red" cubby, her desk inside the "red" square, her schedule on the red poster, etc. Very few verbal instructions are given when using the TEACCH approach because children with autism have difficulties with verbal comprehension. Transitional times can be a problem for these children so even waiting is spelled out in steps visually. For example, if the child is told to "Wait" the child could be taught to go to the "red" carpet square and sit down with her hands folded in her lap. The visual carpet makes sense of the abstract concept of waiting. The TEACCH method requires that all materials, toys, games, etc. are stored in a designated space and labeled so that they are easily accessible to the child.

The purpose of the organization and structure of the TEACCH program is to encourage the child's independence and therefore better prepare the child for independent living later in life.

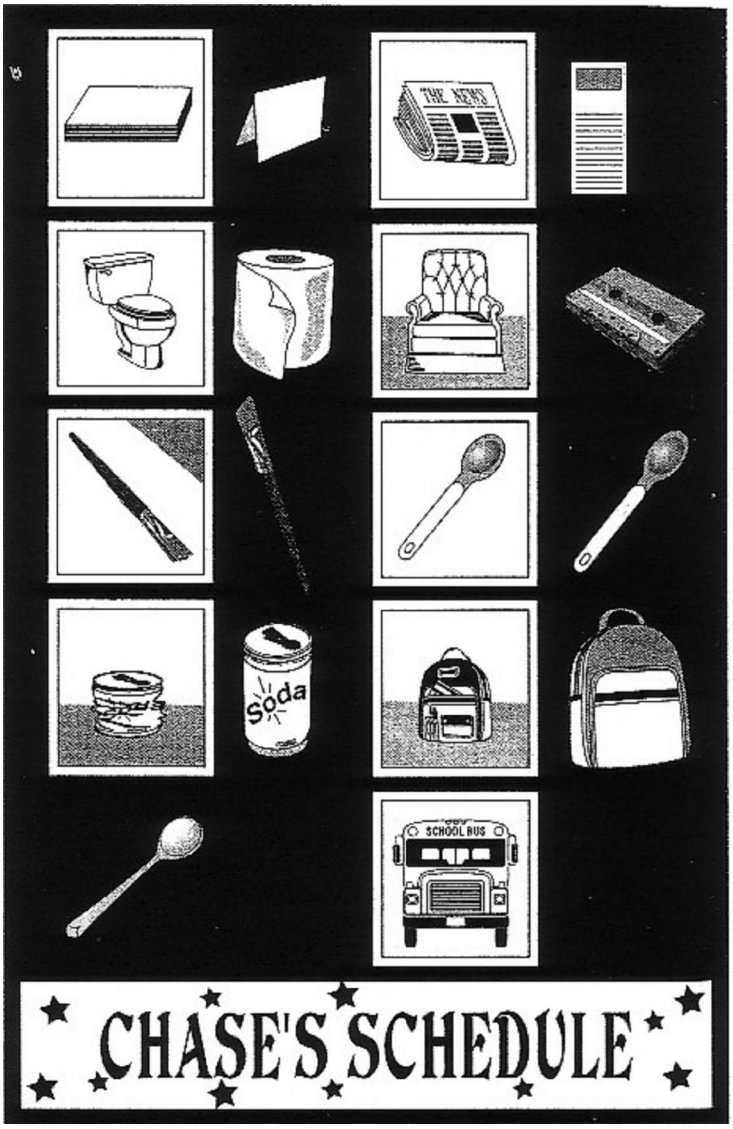


Plate 3.1: A Visual Schedule.

(Source: Scueuerman & Webber, 2002)

3.2.2 PLAY

Play has relationship to the cognitive, emotional, social, and physical development of the child as is evident in the current literature as well. Pamela Wolfberg gives an excellent summary of some of the current literature. During play, the child explores and manipulates objects, which helps him to become aware of function and meaning. As the child learns the use for these

objects and attributes meaning to them, he is able to determine relationships between them and assign them to various categories. Through play the child also becomes aware of cause-and-effect and spatial relationships too (Wolfberg, 1999). In pretend play, the child transforms objects into things that they are not. This helps the child to develop abstract thought, the ability to associate, and logical memory (Piaget, 1962 and Vygotsky, 1966 in Wolfberg, 1999). Because play is by nature flexible and creative, the child feels at ease to put things together in novel ways. This promotes the formation of problem-solving skills.

Play Therapy

Children with autism have difficulties with play. While the impulse to play is not entirely absent, it is notably subdued in children with autism. They encounter many struggles in play. For example, individuals with autism may focus on an object and manipulate it over and over for hours on end. They also have communication problems that may limit them in play. They usually play in a literal way and have trouble adopting a non-literal orientation in pretend play. Also, they lack the social skills needed to relate to their peers and therefore are often excluded. If they get caught in a cycle of peer rejection they are then deprived of opportunities to learn to play in more conventional and socially acceptable ways. For this reason, Play Therapy is an important part of the Rehabilitation and educational process.

A natural setting is a location where, if given the opportunity, children would choose to play. What more natural a setting exists for children to play and interact than nature and the out doors? Children love to play on playgrounds, in sandboxes, on swings, and bicycles. In addition, they also enjoy interacting with nature, climbing on rocks, collecting bugs, looking under a decaying log, or digging in the dirt for an earthworm. Therefore, it makes sense to extend the therapeutic/educational environment outdoors, especially for Play Therapy.

Also, contact with nature brings abstract concepts like the seasons to life. When the child feels the chill in the air and jumps in the pile of leaves on the ground, the play leader can show the child in a concrete way what autumn means. They help to engage children with each other and with their environment to support growth and development of communication and social skills.

They should have clearly defined boundaries and an explicit organization. Play materials should be accessible, visible, clearly labeled, and logically arranged. Playmates should include other children with autism as well as typically developing peers.

The Importance of Play

Healing gardens designed for children are based on several basic assumptions. The first of these is that play is important to the development of the child. Therefore, background on the nature of play will be discussed.

First of all, what constitutes play? A review of the literature suggests that there are certain characteristics that distinguish play behavior from non-play behavior (Garvey, 1977; Rubin et al., 1983; Smith and Vollstedt, 1985; Wolfberg, 1999). These characteristics can be observed in the play of typical children everywhere. The first characteristic of play is that play is fun! And a child at play usually displays a positive affect with humming, smiling, and/or laughter. Secondly, play requires involvement by the child. The motivation to play comes from the child and the child chooses freely.

Therefore, play is voluntary. And the child is not interested in attaining some goal for it is the process of play that is important to the child. There is an open-ended quality to play and the rules and goals are flexible and ever-changing. Finally, play has non-literal meaning in that children often imagine objects, actions, or events to be something that they are not.

Play and Development

During play, the child explores and manipulates objects, which helps him to become aware of function and meaning. As the child learns the use for these objects and attributes meaning to them, he is able to determine relationships between them and assign them to various categories. Through play the child also becomes aware of cause-and-effect and spatial relationships too (Wolfberg, 1999). In pretend play, the child transforms objects into things that they are not. This helps the child to develop abstract thought, the ability to associate, and logical memory (Piaget, 1962 and Vygotsky, 1966 in Wolfberg, 1999). Because play is by nature flexible and creative, the child feels at ease to put things together in novel ways. This promotes the formation of problem-solving skills.

Play also provides opportunities for the child to learn subtle **social** skills such as how to enter into play with peers or how to extend an invitation. To establish and keep friendships the child must also learn how to share, and enter into mutually satisfying play activities. Through these play relationships the child has opportunities to express intimacy and affection. Social skills that arise out of conflict with peers such as negotiation, compromise, and trust are learned through play as well (Dunn, 1988; Garvey, 1977; Howes, Unger, and Matheson, 1992; Parker and Gottman, 1989; Wolfberg, 1999).

All of these social interchanges with peers require **language** and communication. Therefore, it follows that through play the child learns new vocabulary, complex language structures, and the rules of conversation (Ervin –Tripp, 1991; Garvey, 1977; Wolfberg, 1999).

Through play the child explores and develops his **physical** capabilities as he/she runs, jumps, climbs, and balances. Besides improving gross motor function, the child challenges fine motor skills by manipulating pebbles, sticks, four-leaf clovers, game pieces, and doll clothes. And

finally because play helps the child deal with stress (Elkind, 1981) and work through confusing experiences of the past and present (Erikson, 1950; Freud, 1946), it serves an important role in the child's **emotional** development as well (Wolfberg, 1999). To summarize, play is important to the development of the child because it is the primary vehicle for learning and developing thinking skills, social skills, language, and self-concept, and for developing gross motor and fine motor skills. For this reason, play is an essential element in the design of gardens for children.

Play spaces should accommodate approximately five children, have clearly defined boundaries, and explicit organization with materials accessible, visible, clearly labeled, and logically arranged around activities and themes (Wolfberg, 1999). In summary, play is important to the development of every child. Children with autism experience a number of problems engaging in play. It is the purpose of play therapy to design truly effective and meaningful play interventions for children who experience problems with play with the hope that these experiences will have an impact on their social, verbal, and cognitive development.

Design and healing gardens

In designing a healing garden, two goals are in mind. The first goal is the process of healing and the second goal is to design an outdoor environment that will support this process Environmental preference studies have shown that a natural setting is the view of choice. Charles A. Lewis refers to it as "green nature" (Spriggs et al., 1998). Gordon Orians and Judith Heerwagen, in their studies on landscape aesthetics, have shown that people prefer open, distant views with scattered trees, water, and refuges and paths that suggest ease of movement. In studies of users of some urban parks, properties such as vegetation, water, and savanna- like qualities, such as scattered trees, grass, and spatial openness, seemed to correlate with ratings of

restoration (Ulrich and Addoms, 1981). In his article, *Healing Words*, J. William Thompson quotes experts in the field of healing garden design: "Anything green makes patients feel better, any plant, any tree," and "…if they wish to create truly healing spaces, landscape architects would do well to discover – or rediscover—the wonder of the plant kingdom" (Landscape Architecture, Jan. 2000).

The literature also mentions negative characteristics considered intrusive to the user of the healing garden. These features may increase stress rather than foster relief from it and may aggravate an already heightened physiological state, say Marcus and Barnes (1999). Urban noise such as traffic, machinery, air-conditioning units, and loud voices are all considered negative distractions in a healing garden. Intrusive sounds should therefore be excluded from healthcare gardens or masked with the sound of water, screened with vegetation, or a different location should be chosen for the healing garden altogether. Smoking is also considered to have a negative impact on the users of the outdoor healing space. In order to provide a positive experience for all users it would be wise to have separate spaces for smokers and non-smokers.

An unexpected feature included in this list is sunlight. While most people benefit from exposure to sunlight each day, some patients may have adverse reactions to it. For example, some medications may cause the patient to have increased sensitivity to sunlight. For this reason, it is suggested that a variety of spaces be incorporated into the design, some that include full exposure to sunlight and others that have filtered sunlight or dappled shade.



Plate3.2: Healing Garden Settings

(source: design guidelines of a therapeutic garden for autistic children)

Healing gardens are found in a variety of healthcare settings. Not only are they found in acute care general hospitals, but they are also found in psychiatric hospitals, rehabilitation centers, Alzheimer treatment centers, hospitals and settings for children, nursing homes, AIDS and cancer treatment centers, and hospices for the dying. There are many different kinds of outdoor spaces in these settings. These include landscaped grounds, entry gardens, courtyards, plazas, roof gardens, roof terraces, healing gardens, meditation gardens, viewing gardens, private gardens, nature trails and preserves, and atriums.

Healing gardens for children

Gardens have a special place in healing environments for children because of the importance of play in the child's world. Play is the child's way of making sense of his/her physical and social world. Children of many different types may benefit from a healing garden, whether they are recovering from an operation, working through the turmoil of a traumatic experience, coming to grips with a terminal illness, or living with a permanent or profound mental or physical

impairment. The term habilitation rather than rehabilitation is used to refer to the treatment of those with disabilities. It is important to focus on the child's potential. This way the healing garden can become a place to practice and improve old skills while discovering new skills.

When reviewing the literature, it became apparent that healing gardens for children are designed based on several assumptions. The following list has been adapted from Moore et al (1987) and Marcus and Barnes (1999).

i. Outdoor play is a critical factor in healthy child development.
ii. The quality of the outdoor play environment can affect the child's perception of it and the range and depth of play.
iii. Nature plays an important part in play in the development of the child.
iv. Intervention of play leaders/therapists can extend the range of play.
v. Children of all abilities have an equal right to play opportunities.
vi. Indoor/outdoor links are important in encouraging use of the outdoor environment.

Several types of therapies are used in treatment of children. Examples of these are Play Therapy, Horticultural Therapy, Animal Therapy, Nature as Therapy, and Sensory Integration. Any one or a combination of these may be incorporated into a garden designed for children.

Children's Gardens

The first example of therapeutic-site design for children can be found at the Institute for Child and Adolescent Development in Wellesley, Massachusetts. This design which was the recipient of the ASLA President's Award for Excellence has been cited several times in the literature (Crisp, 1998; Landscape Architecture, 1995; Marcus and Barnes, 1999). This therapeutic garden

was designed by Douglas Reed, ASLA, for children suffering from a variety of emotional and behavioral disorders resulting from trauma. Its primary purpose is to allow a series of distinct experiences to help the child reveal feelings that he or she may have difficulty articulating. Experiences include safety/security, exploration, seclusion, discovery, and risk taking. The site's most important physical feature was a swale that was once a stream, which inspired the design of a rill of water that weaves its way through the site, connecting the experiences. These spaces in turn correspond to the stages of a child's recovery.



Plate 3.3: Institute for Child and Adolescent Development in Wellesley, MA.

(Source: Dunwell, S. Winning Big. *Landscape Architecture*, 87, 11)

Another excellent example of a therapeutic garden for children can be found in New South Wales, Australia. **Lucas Gardens School** is located in a suburban community outside Sydney and linked to a nearby residential pediatric hospital. It was opened as a school for children with

multiple disabilities. Many of the children are transported to the school each day from the nearby hospital where they are permanent residents. This garden is a series of connected spaces designed to support numerous activities. There is a sensory garden with activity stations, texture table, splash table, swinging garden bench, a shade house, big grassy "paddock", an outdoor stage, potting shed and area for propagating plants, earthworm breeding farm, a palm garden, butterfly and bird garden, secret garden, and other features. Teachers, teacher's aides, and therapists use the garden to work one-on-one with the children. The garden is successful in that it is always being used.



Plate 3.4: Lucas Gardens School in New South Wales, Australia.

(Source: Moore, R.C. in Marcus and Barnes, 1999, *Healing Gardens*.)

The Leichtag Family Healing Garden at the Children's Hospital and Health Center in San Diego, California is considered an informal strolling garden for children. While most healing gardens are about the miracle of life, Delaney says the concept behind this garden was to provide a place to imagine life being larger than what's existing at the moment. The designers

have approached the elements of the garden – color, texture, form, and scale- from the point of view of a child. The beautiful colors and interesting textures and forms immediately attract the child and provide momentary relief from the worries of the hospital. Unfortunately, there is little for the child to do. The garden provides little in the way of manipulative play (activities such as digging in sand, piling up blocks, turning over rocks, picking up sticks, and leaves and such) and the child loses interest quickly. Thus, the garden is empty for long periods of time and significantly underused. In addition, some users found the hard surfaces jarring and suggested adding more trees and greenery.

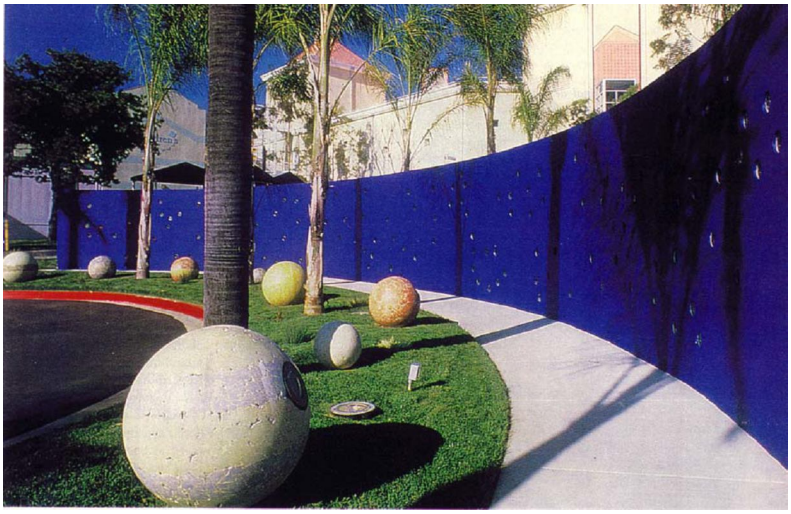


Plate 3.5: The Leichtag Family Healing Garden at the Children's Hospital in San Diego, California.

(Source: Taylor, G. and Cooper, G. A Healing Garden).

Sensory Room

A Sensory Room is a place where children and adults with special needs can explore and develop their senses and skills. The multi-sensory room can have many different features

ranging from soft play areas, padded floors and walls and interactive equipment which make dramatic changes to the sensory room environment using sound, lighting and fragrancing.



Plate 3.6: A multi sensory room

(Source: www.sensoryroom.com)

A Multisensory room can engage children who can learn through play. From following bright lights, shapes and patterns with their eyes to pressing buttons to make the sensory room change colour or even change colour to music. Users will become interested in their environment. Also due to the flexible functionality of the multisensory room it is also used to calm and de-stress.



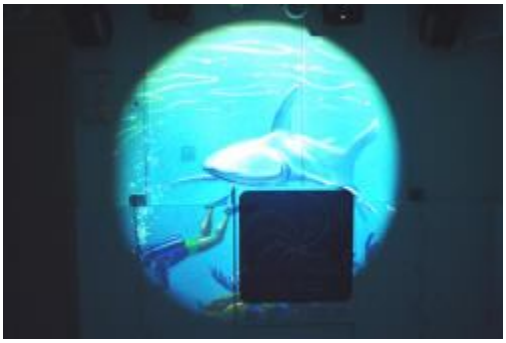


Plate 3.7: A multi sensory room

(Source: www.sensoryroom.com)

Both children and adults become interested in their environment. The overactive can be calmed, the inactive become interested. The partially sighted can see the vivid moving colours. Those mobile can chase the slowly moving images. The whole room can change colour by applying pressure to simple switches or pressure pads. Colours can move or change simply by making a noise and for those with severe special needs the sensory room can be set to automatically change programs, giving a constantly changing and interesting environment that is probably the most pleasant environment they have ever experienced even if all they can do is lay and enjoy it!

3.3 ARCHITECTURAL ELEMENTS USED IN CREATING AUTISM- FRIENDLY ENVIRONMENT

Design elements for the purpose of this research are defined as "physical elements in a building. A simple layout with unfussy detailing and easily understood materials and colours are much preferred. Anything too complex will confuse. Easy recognition of spaces and rooms is essential and this can be determined by carpet colours and the way spaces flow from one to another. Also curved walls have been found to help some children to move through the building as they like to follow the curve and avoid sudden corners.

3.3.1 Building form

Planning and layout will dictate how the building works and is used. Space and perhaps the 'sense of space' is the critical consideration. A space 5 x 3 metres which is 3.5 metres high will

have a greater ‘sense of space’ than a space 5 x 3 metres with a 2.5 metre high ceiling. That is a crude example but sloping ceilings combined with curved walls can create not only a greater ‘sense of space’ but also a more interesting space to move around in (Christopher 2006).

Curvilinear walls facilitate movement in building. This is particularly useful for children who have difficulties with visuo-spatial processing. It has been noted 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. Care givers noticed that children often placed their hands on the walls, following the contours round the corridor.

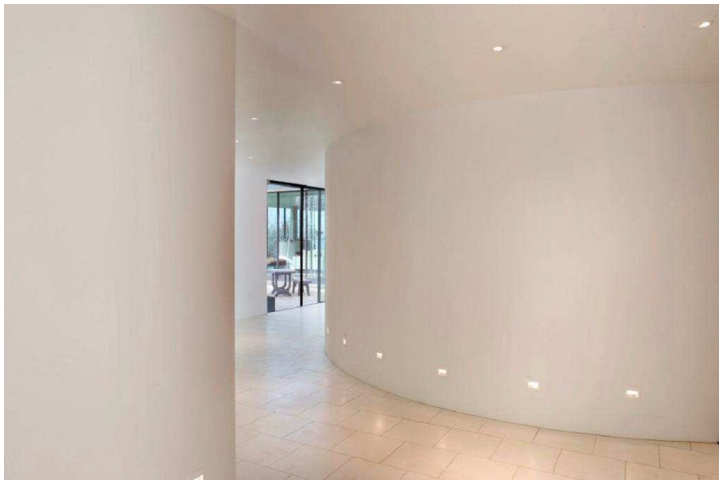


Plate 3.8: A view of Curvilinear Walls

(Source: www.Architecture and Autism)

The most difficult space is the corridor. Corridors have been banished in this type of buildings and even the word is now outlawed. Of course there has to be a means of getting from A to B but it is been called circulation space. It has to be an interesting space, not just a box shape, but a multi-functional space. So the institutional corridor has been turned into a social and activity space or even the focal point of the building. There is no doubt that the children will feel liberated by the sense of freedom this space offers.

3.4.2 Colour

Colour can play an important part in the 'feel' of a building. Suffice it to say that there are neutral colours, calming colours, disturbing and stimulating colours. Careful choices have to be made to ensure a good balance between the common and private spaces. It is a good idea to choose the colour for their room from an approved range.

Research has found that some colours can disturb or alter the mood of children, while others have a calming effect. Shades of pink and purple have been found to be the most positive colours and these have consequently been used extensively on walls. Gray has also been widely used as this has been shown to be a neutral and non reflective reaction. Consequently, windows, doors, frames and skirting have been stained gray (adopting a more environmentally friendly alternative to paint). The bedrooms can be painted in colours chosen by the children who live in them.



Plate 3.9: A view of play areas

(Source: www.Architecture and Autism)

3.4.3 Lighting

Lighting is something that can make or break a building and it takes a great deal of careful thought and selection of light fittings to get it right. Electrical engineers commonly do the lighting and usually show you some pictures of light fittings they have chosen out of a catalogue. Their main concern is whether the recommended lighting levels are achieved but this has nothing to do with ambience, flexibility and the overall quality that good lighting can add to a building.

Care should be taken to avoid flickering fluorescent lighting as this can be disturbing to people with ASD. Compact fluorescent is acceptable but the specification always needs to be checked to make sure that fittings are fitted with the appropriate diffusers.



Plate 3.10: A view of high level windows for lighting

(Source: www.Architecture and Autism)

Good levels of even natural light will help make and clarify a space, how it falls onto walls and floors will help a person come to terms with a space. As Le Corbusier states it has emotional power. It is how much power we should introduce into a space that we need to consider for people with autism

It is common for children and adults with ASD to sleep with the light on but a lighting level suitable for waking hours may not be suitable at night. Flexibility is the key here so that the lighting level can be reduced. One possibility is to achieve this by means of a dimmer or scene-setter but these are usually fragile mechanisms and are easily damaged.

Care staffs have indicated that as it gets nearer to bedtime, it would be a great benefit to be able to reduce the lighting level to encourage a sense of quiet as preparation for sleep. Interestingly, although the day is usually highly structured, it is less common to have a hard and fast bedtime as a single rebel can cause a group protest with alarming results. The concept of voluntary bedtime, albeit encouraged by 'mood' lighting seems to be much preferred

3.4.4 Acoustics

Acoustics is probably the most important aspect of design to get right since it influences the choice of materials and so the look and warmth of the building. Noisy spaces are to be avoided. A sense of calm will undoubtedly encourage better behaviour and a feeling of well-being amongst residents and staff. Carpet on the floor will reduce the impact of foot traffic and will absorb sound as well as provide opportunities for decorative treatments. It have also been found that rough wall finishes such as fair faced brickwork with raked joints (used sparingly) can be very successful at breaking up reflected sound waves and so reducing noise levels; but should

only be used in locations where there is no risk of self-harming. Ceilings are difficult to deal with but successfully used timber slats set about 10 mm apart with an acoustic sound absorbing mat in the cavity behind. A proportion of the sound goes through the gaps and is not reflected back into the space. Timber is a warm material and can be left natural or stained in any colour.

3.4.5 Outdoor spaces

Outdoor spaces are an essential part of any individual's environmental awareness. A secure play space that is overlooked by residents and carers is a great asset and can provide the children with a sense of independence. They can enjoy the freedom without the feeling of being obtrusively observed.



Plate 3.11: A view of children playground

(Source: www.Autism and playgrounds)



Plate 3.12: A view of children playground

(Source: www.Autism and playgrounds)



Plate 3.13: A view of children playground

(Source: www.Autism and playgrounds)

3.4 SUMMARY OF FEATURES OF AN AUTISM FRIENDLY ENVIRONMENT THAT IS PARTICULARLY CRITICAL TO THOSE WITH ASD

Way finding

i. Clear geograph

ii. Curved walls

iii. Colour coding

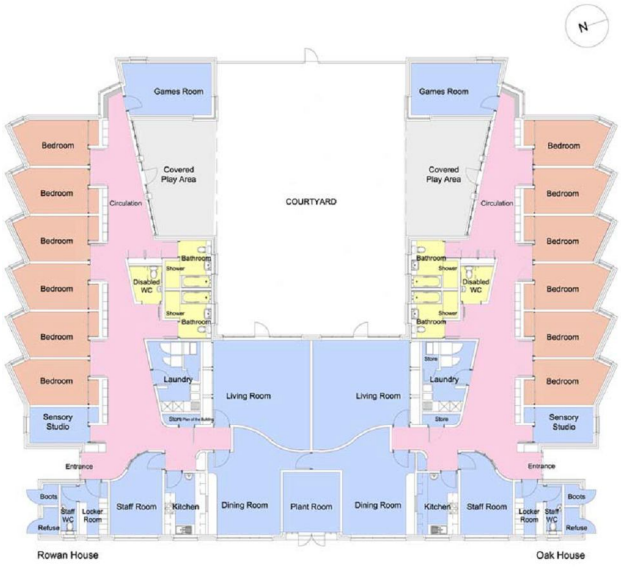


Plate 3.14: A view of school design

(Source: www.Autism friendly environment)



Plate 3.15: A view of wrongly design school

(Source: www.Autism friendly environment)



Plate 3.14: A view of good design circulation space

(Source: www.Autism friendly environment)

Circulation

• No corridors

• Eliminate 'running opportunities'

• Spaces for socialising and being alone

• Consider proxemics and space requirements

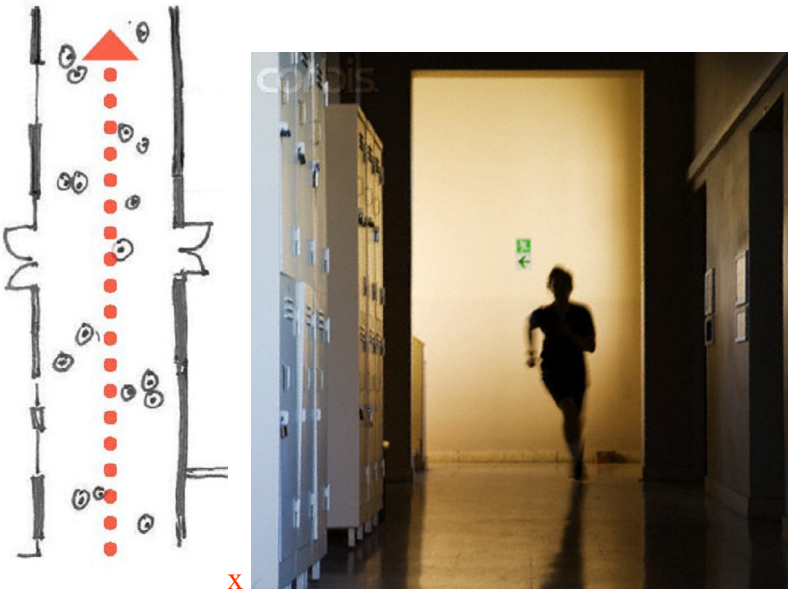


Plate 3.15: A view of wrongly design circulation space
(Source: www.Autism friendly environment)



Plate 3.16: A view of good design circulation space
(Source: www.Autism friendly environment)

Calm and simple spaces

•Good acoustics

•No confusing textures



Plate 3.17: A view of good design with calm and simple space

(Source: www.Autism friendly environment)



Plate 3.18: A view of bad design circulation space

(Source: www.Autism friendly environment)

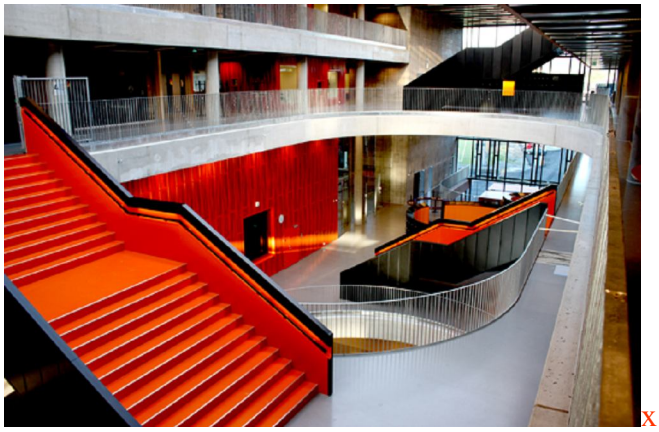


Plate 3.19: A view of bad design circulation space

(Source: www.Autism friendly environment)

Quiet Rooms

• Essential for calming

• Even distribution throughout building

• Can double for alternative use

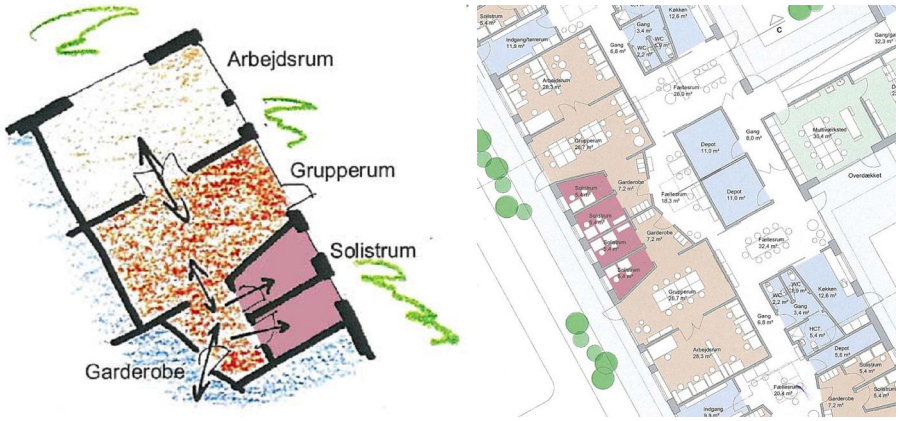


Plate 3.20: A view of bad design circulation space

(Source: www.Autism friendly environment)

Colours

• Review preferred colour palette

• No stimulating colours

• Consider colours in daylight and artificial lighting conditions

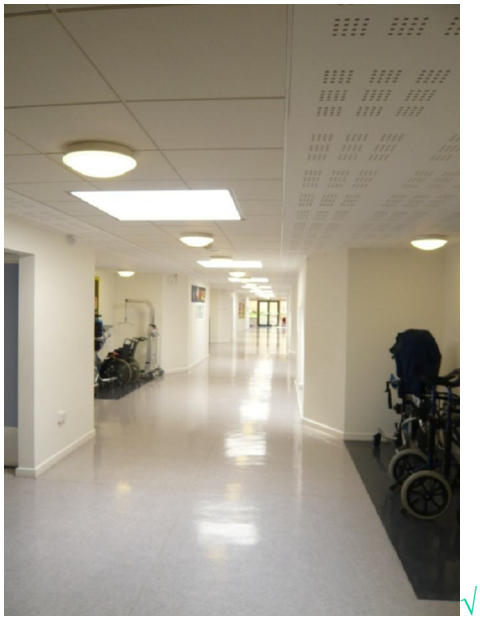




Plate 3.21: A view of good design circulation space

(Source: www.Autism friendly environment)



Plate 3.22: A view of bed room

(Source: www.Autism friendly environment)

Lighting

• No flickering fluorescent lighting

• Hidden or indirect lighting preferred

• A 'glowing' environment

• Incorporate dimming facilities

• Consider coloured lighting for scene setting

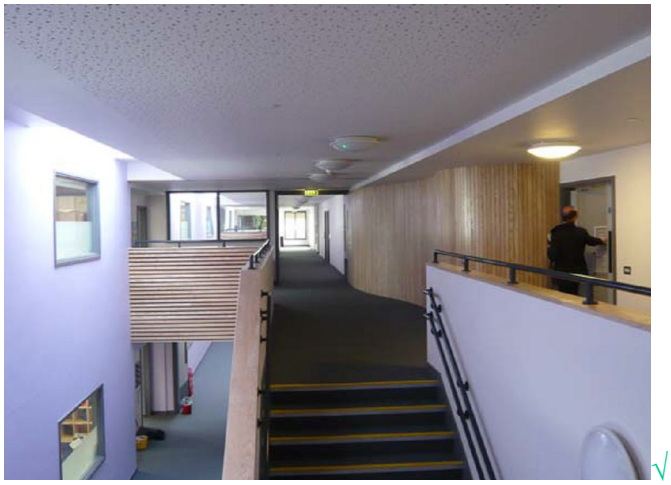


Plate 3.23: A view of good design circulation space

(Source: www.Autism friendly environment



Plate 3.24: A view of chilren play space

(Source: www.Autism friendly environment)



Plate 3.25: A view of bad lightening system

(Source: www.Autism friendly environment



Plate 3.26: A view of bad lightening system

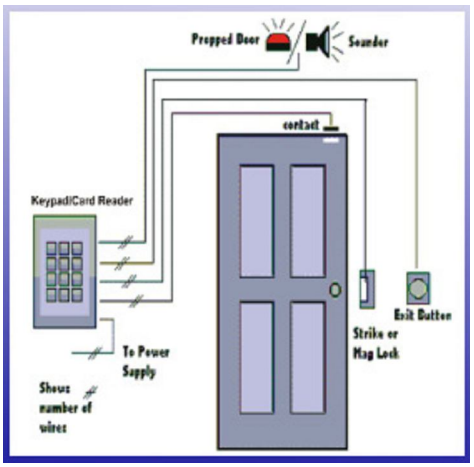
(Source: www.Autism friendly environment)

Security

• Design of doors

• Fire escape routes

• Minimise doors to outside



√



Plate 3.27: Good security door system

(Source: www.Autism friendly environment)



X



Plate 3.28: Bad security door system

(Source: www.Autism friendly environment)

CHAPTER FOUR

CASE STUDIES

4.1 INTRODUCTION

Case study is an in-depth study of one or more similar projects to the research scheme at hand. It aids in working through particular principles, and assists the researcher to identify factors leading to its success or failure. In architecture, it is normal practice to carry out preliminary studies of similar existing projects. This enables the architect to have a general overview on how best to approach the design problem, analyze and determine the pros and cons associated with planning, design and user satisfaction. This is done with a view to evolving a better design.

4.2 SELECTION CRITERIA

In Nigeria, there are no comprehensive rehabilitation centers for persons with Autism Spectrum Disorder alone. Most rehabilitation centers combine a variety of special needs ranging from sensory, mental to physical impairments. Hence the following criteria were used in the selection of this scheme;

- Institutions specific to rehabilitation for persons with Special needs.
- Elements of Universal Design features.
- The presence of accessible features for persons with special needs
- Regional similitude with study area
- Elements of physical and vocational programmes.

The following case studies were chosen based on one or more of the above criteria.

- Rehabilitation Center Kakuri-Kaduna

- Rehabilitation Center Kuchiko – Abuja
- Netley Primary ASD Unit – Haverstock
- Whitton Gateway ASD Unit, Whitton School, Percy Road, Twickenham, London
- Montessori children's school, Stamford, USA

4.3 VARIABLES

In building design, the key issues are usually aesthetics, functionality, comfort and environmental impacts of the building.

Scope of rehabilitation

The scope of rehabilitation programmes in an institution is usually the foundation of a successful rehabilitation offered to rehabilitees. Range of features often determine how equipped the rehabilitee will be for the life ahead at the end of the day. This scope is enumerated and reviewed in these case studies.

Planning

The planning aspect of design contributes to the performance of the design scheme. The planning patterns of the selected case studies were analyzed to glean different perspectives from which the proposed rehabilitation centre can be approached.

Accessibility

Factors that constitute accessibility in a facility are usually determined by the level of usability of that facility by the users. Usually the bulkiest assistive device comes into play. The factors include provisions for clearances, reach limits, manoeuvring spaces and supporting infrastructure to allow access for a disability or assistive devices.

Facilities and equipments

The available facilities and equipments in the case studies were also analyzed to acquaint the researcher with further possibilities towards the proposed design.

Road network

Analyzing road networks is important in determining how vehicular traffic might, or not, pose a hazard to rehabilitees in the proposed rehabilitation center.

4.4 CASE STUDY 1: REHABILITATION CENTER KAKURI-KADUNA

Background

This center is located at Kakuri, in the southern part of Kaduna town. The Kaduna rehabilitation center was established in 1977 during the FESTAC period. Visitors were expected to the country, and the center was expected to accommodate and free the streets in Kaduna metropolis of the destitute. It was first situated in Nassarawa village, with the center providing only accommodation and everyday needs of the people. The residents naturally drifted back to the streets, as there was no engaging enterprise to be pursued at the center. This culminated in the establishment of a proper in rehabilitation center in 1979, at Kakuri.

Scope of rehabilitation

The center provides for persons with physical and mental disabilities, training them in various vocational trades which include carpentry, weaving, knitting, tailoring, leather works and animal husbandry. The programme is for the duration of three years, but usually determined by the rehabilitees' progress. It has a maximum capacity to accommodate 500 rehabilitees, but full capacity cannot be exploited due to lack of funds.

Planning

The site is situated on a relative flat piece of land, at Makera in the southern part of Kaduna town. The center is made up of 4 sections; the staff quarters and gatehouse, the working area (administrative block, workshops), ancillary facilities (clinic and dinning), and the hostel accommodation. Served by one gate, the ancillary facilities are located about the north western axis of the site while the accommodation facilities occupy the south eastern side. The administrative section (see Plate 4.1) forms the core central of the institution. Staff quarters are located opposite the administrative area.

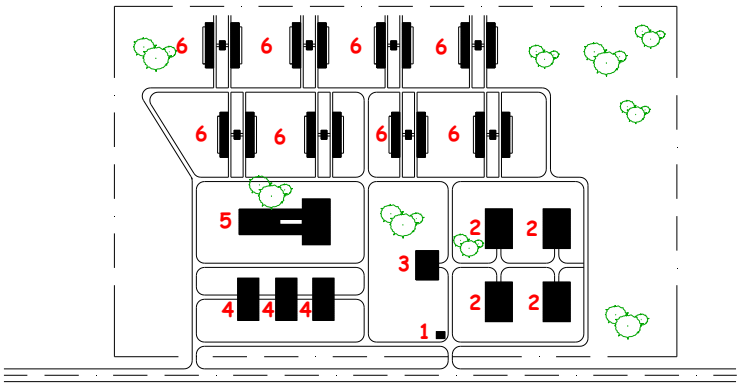


Figure 4.1 Kaduna Site Plan

Source: Field work

LEGEND

1. Gatehouse
2. Staff housing
3. Administrative block
4. Workshop
5. Dining\clinic
6. hostels

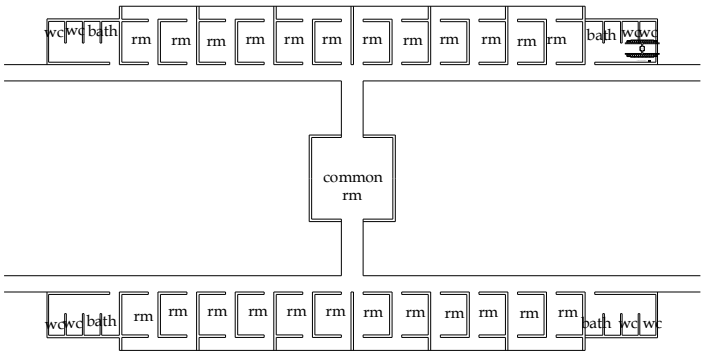


Figure 4.2 Hostel plan

Source: field work

Accessibility

Ramps of 1200mm are provided throughout the center, with three tiers of guide rails attached to the ramps and corridors in the hostel area (see Plate 4.2). The guide rails have tactile markings to inform persons with visual impairment of their location within that area. Room accommodations and workshop are spacious enough to accommodate wheeled devices, measuring 3600mm by 3600mm.

Facilities and equipments

Facilities in the center include eight numbers of hostels, each consisting of 24 rooms, 2 toilets and bathrooms at the approach end of each hostel block and a common room (see fig. 4.2). The staff quarters consists of two bungalows and two semi-detached housing units. A dining hall, clinic, 3 blocks of workshop and a classroom are also provided. Only vocational trade

equipments are provided in the center. These include sewing machines, weaving frames and carpentry tools.

Road network

An un-tarred road network links all sections within the complex and to the ramps in the hostels, but without segregation of vehicular from pedestrian traffic.



Plate 4.1 Administrative block

(Source: Field work)



Plate 4.2 Hostel

(Source: Field work)



Plate 4.3 Ramp in hostel

(Source: Field work)

4.4 CASE STUDY 2: REHABILITATION CENTER KUCHIKO – ABUJA

Background

This center was established in 1998, but closed down within a year, due to lack of funds. It re-opened in 2004, admitting only persons with lower limb impairments. The center has a capacity to house 100 rehabilitees, and also runs apprenticeship community based rehabilitation, where rehabilitees not resident, come in daily for their vocational training with volunteers within the community issuing assistance in their training.

Scope of rehabilitation

The scope of rehabilitation programme covers vocational trades and sporting activities. The trades taught include shoe making, carpentry, tricycle fabrication and electronic repairs. Football is played within the center as part of rehabilitee re-engagement programme.

Planning

Facilities are arranged linearly with a paved route running parallel to the U – shaped site layout all accessible to a paved walkway.

Accessibility

The center has paved but uncovered walkways which are 1000mm wide running parallel to all the facilities, but not connecting to them. Ramps are provided only in a few hostels. This far, is the extent of accessibility features provided.

Facilities and equipments

Facilities provided include poultry shed, 4 indoor and 1 outdoor workshop, administrative block, 2 classrooms, auditorium, dining hall, fishpond, director's house and a semblance of football field. Pit toilets are provided behind the hostel accommodations. Vocational training equipments include welding machine, carpentry tools and electronic repair kits.

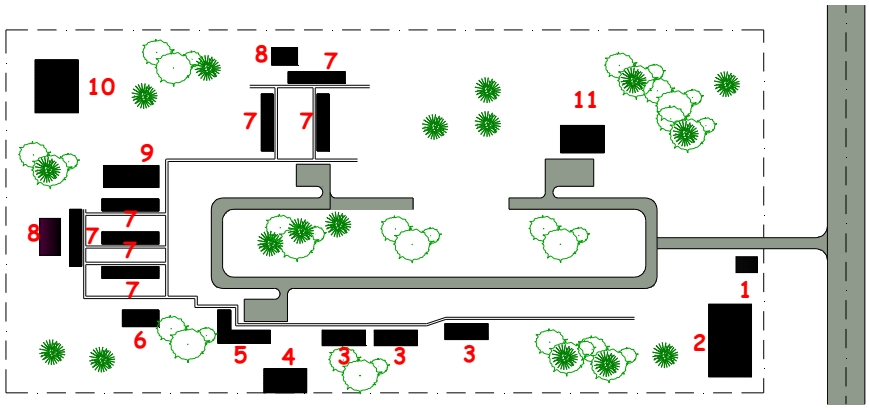


Fig. 4.3 Abuja Site Plan

(Source: Field work)

LEGEND

1. Gate house
2. Poultry
3. Workshop
4. Welding shed
5. Administrative block
6. Audio visual room
7. Hostel
8. Conveniences
9. Dining hall
10. Fish pond
11. Director's house

Road network

Road network is a broken O shape running alongside all facilities within the center. There is a clear segregation between vehicular and pedestrian traffic.



Plate 4.7 Hostels

(Source: Fieldwork)



Plate 4.8 Paved Walkways

(Source: Field Work)



Plate 4.9 Workshop

(Source: Field Work)

Netley Primary ASD Unit – Haverstock Associates Camden, NJ

Completion: September, 2003



Plate 4.10 Approach view

(Source: Designing learning spaces for children on the autism spectrum)

Background

Netley ASD Unit is a specialist facility for autism built within the existing grounds of Netley Primary School. Haverstock Associates were commissioned to carry out the design of the unit at Netley. The lack of involvement of the end user teaching staff has led to some conflict between the way the building is used and the way it was intended to be used.



Plate 4.11. Courtyard at Netley

(Source: Designing learning spaces for children on the autism spectrum)



Plate 4.12: Entrance from William Street

(Source: Designing learning spaces for children on the autism spectrum)

Planning

The site issues were extremely tight with the architects settling on an 'L-shaped' plan, which retains exclusive private courtyard space for the unit, backed up against an existing corner of the main school building. The two teaching spaces are separated by an entrance lobby which makes use of curves to 'break the mould' of a rectilinear institutional space. This detail echoes the baffled walls to the courtyard of the adult education unit. The classrooms have more space per child than would typically be the case as John Jenkins argues, 'these kids need a bit of elbow room'.



Plate 4.13: Entrance to unit

(Source: Designing learning spaces for children on the autism spectrum)



Fgure 4.3: Entrance to unit

(Source: Autistic Children Center)

PROGRAM

entrance/lobby

community room

classrooms

multipurpose spaces

office spaces

restrooms

storage



Figure 4.4 Autistic unit vs community centre

(Source: Autistic Children Center)

The classrooms are designed as 3D spaces with different areas defined in plan and section to create diversity within a single space. Both classrooms incorporate a 'one-to-one' or withdrawal space and a separate wet-room area



Plate 4.14: Classroom space

(Source: Designing learning spaces for children on the autism spectrum)

Given that the brief for Netley is for two teaching spaces only, it would be unrealistic to expect a greater mix of spaces over and above this. Both classrooms have extensive, floor to ceiling windows providing good daylight and views to the courtyard. Roof lights to the rear of each classroom provide additional lighting during the day and ventilation.



Plate 4.15: Roof lighting to classroom

(Source: Designing learning spaces for children on the autism spectrum)

The extensive windows to the courtyard were seen by staff as providing too much daylight and visual distraction. As a result the staff have placed opaque paper over the windows, creating an overly internalised environment. The architects have now proposed integral blinds to subsequent units for children on the autism spectrum to allow staff greater control. The classrooms maximise pinboard space to allow the staff and pupils to introduce their own stimuli. Also the one-to-one space is extensively used to employ different teaching methods like TEACCH and PECS, as the main space can provide many distractions. Pupils' workstations were not 'built in' to the space in the belief that this would allow the teaching staff greater flexibility. This was felt by staff to contribute to a lack of order in the teaching environment.

The entrance to the unit, being through a private courtyard is completely secure. The courtyard can only be accessed through an intercom and CCTV system on William Street. The entry systems for the two separate functions of the building are kept entirely separate. The extensive window walls to both classrooms provide good views to the courtyard for children and staff (for reasons of supervision). The classrooms are muted, with neutral colours to both walls and floors. The exception to this is the entrance hall, where the architects have employed colour and used a curved, green wall to create a more welcoming but calm atmosphere.



Plate 4.16 View from classroom to entrance hall

(Source: Designing learning spaces for children on the autism spectrum)

Research has shown the colour green to have a typically calming effect on people on the autism spectrum (Pauli, Egerton and Carpenter, 1999–2000).

Facilities and equipments

The unit accommodates two teaching spaces and a multi-purpose therapy room in addition to a staff office, toilets and storage areas, in a single storey design. The building also accommodates

an adult education unit. This includes a crèche, which is used by Camden LEA as a community facility. The classrooms are accessed through a private courtyard, entered from an electronically operated gate, whilst the adult unit is accessed separately from the street.

Merits

i. Haverstock Associates pursue a green agenda with all buildings and this is reflected in the buildings use of water-based paints and non-toxic materials. Both classrooms have extensive built in storage areas, which can be completely closed off from the teaching space.

Demerits

1. Whilst computers are used in the classrooms at Netley they did not seem to be employed in a way that was specific to the autism learning experience.
2. The positioning of some of the ironmongery which could be operated by the children was seen by the teaching staff as presenting a security risk. Staff also said they would like to have greater control over levels of day-lighting within the classroom environment.

4.4.3 Whitton Gateway ASD Unit, Whitton School, Percy Road, Twickenham, London

Background

Whitton Gateway ASD Unit is a specialist facility for secondary children on the autism spectrum. The unit is situated within the grounds of the existing campus of a school and also doubles up as a school community facility.

The Gateway Centre is the local authority inclusion centre for students with autistic spectrum conditions. It is part of Clarendon school but situated beside Twickenham Academy. Students

attending The Gateway are included in the mainstream opportunities offered by Twickenham Academy, participating in school life within a mainstream peer group. It provides an environment in which students who have an autistic spectrum condition are taught a curriculum appropriate to their needs, including the national curriculum, and are offered the level of support they need to be successful. This is achieved by access to a curriculum that creates the maximum opportunity for students to develop and practice key skills for learning, such as listening, attention, thinking and social skills.



Plate 4.17: Whitton Gateway

(Source: Designing learning spaces for children on the autism spectrum)

The centre caters for students at key stage 3 and 4 (11 to 16 years). There is provision for 20 students. The centre consists of a purpose built, on-site facility including teaching rooms, a large circular meeting and social area, a therapy room, a sensory room theatre and an outdoor play area. All classrooms have interactive whiteboards. There is a computer suite with work stations. Students work in a variety of groupings.

The centre has access to all facilities and buildings in the Twickenham Academy, including the fitness centre and gym with trampolines.

The centre currently has a full-time Head of Centre, two full-time teachers and seven teaching assistants. In addition, the centre is supported by a visiting part-time speech and language therapist (2.5 days a week), an occupational therapist (one session a week), and regular access to an educational psychologist.

Planning

Whitton is a large school with many buildings in its grounds and the site given to the architects was extremely tight in relation to the brief. The unit is in a corner of the school grounds very remote from the entrance so the architects created a separate access which allows the children to be dropped off discretely at the door, rather than being taken through the busy playground in the morning and evening. The building in a sense turns its back on the existing school and is intended to be inward looking, private and discrete, with a desire by the architects to create some secluded green space for the children of the unit. The separate access is doubly important as the school governors wished the building to serve as a community facility outside of school hours. The notion of community was developed by the architects from the idea that the circulation space of the unit would not be just a corridor but would be the main social space and 'heart' of the building.



Plate 4.18 Circular court space

(Source: Designing learning spaces for children on the autism spectrum)

This has resulted in a circular 'assembly' or court space. All but one of the classrooms open directly into this court, which also is connected to the library and external green space. The space is well lit by picture and clerestorey windows and is designed to be calming and non-institutional.



Plate 4.19: Window to circular court

(Source: Designing learning spaces for children on the autism spectrum)

The circle is a strong platonic geometry and provides a powerful orientation device. The short circulation space which leads from the entrance to the court is also designed to feel non-

institutional, using curved walls and is 2 m wide. The unit library provides the link between the main circulation space and the court, resulting in an extremely strong spatial hierarchy.



Plate 4.20: main circulation space

(Source: Designing learning spaces for children on the autism spectrum)

As explained above the key communal spaces are generous and are capable of being used for functions over and above circulation. Furthermore all of the classrooms are considerably larger than would be the case for mainstream children, with a classroom average of 4–5 m2 per child for up to eight children, rather than 2–3 m2 for classrooms of 25–34 children. Classrooms are also designed to be clutter-free with generous integral storage.



Plate 4.21: Classroom picture wind

(Source: Designing learning spaces for children on the autism spectrum)

Each are well lit by a 'picture' window wall, which looks into and provides access to the private green space. The classrooms do not incorporate a one to one space within themselves however, which would be useful for undisturbed one to one working. All picture windows to classrooms and the main court space have internal blinds to allow teaching staff to diffuse sunlight as required. These may however be susceptible to interference by the children. Artificial lighting has dimming control, which can be operated by the staff to adjust lighting levels as required.

Classrooms have extensive use of pinboard space for visual cues. One classroom was capable of being sub-divided by the use of a built in sliding screen which allowed more flexibility to that particular space.

All but one of the classrooms has good visual links to the private, external play space around two sides of the building. The external space has an extensive CCTV system utilised for security and monitoring. Also the site is next to a busy road and

so has a 2 metre high reflective acoustic fence around the two exposed sides of the building.

The internal court space also operates as a spill out zone for children who need to take time out from classroom activity. Windows all have electronic, magnetic locking devices so they can not be operated by the children.

The building has a muted colour scheme which supports the spatial hierarchy utilising both green and blue colours which research shows to be calming. The building's materials and surfaces are robust. Walls are block-work and plaster, with an extremely hard-wearing cord carpet on the floor. All paints and adhesives are non toxic and water-based.

Computers were set up to be extensively used within the classroom environment at Whitton Gateway. Once again this appeared to be dealt with in a generic way and was not specific to autism.



Plate 4.22: Computer workstation

(Source: Designing learning spaces for children on the autism spectrum)

Merits

1. The main court space is naturally ventilated by a mono-draft, 'wind-catcher' system in the roof, rather than by any mechanical ventilation, which can be noisy and distracting.
2. All classrooms haven generous built-in storage.

4.5 MONTESSORI CHILDREN'S SCHOOL

Maryann Thompson Architects Stamford, CT

Completion: 2008

Kindergarten/Preschool/Early Education/Nursery, ages 2-8

Capacity: 120



Plate 4.23 Main entrance

(Source: Autism children centre)

Background

The design for this Montessori School for children aged 2-8 is based around the concept of a 'one room schoolhouse'. The main learning areas all flow as one space, but are cleverly

separated by shifting roof planes, changes in floor level and low furniture rather than walls. This concept of flowing spaces continues in the relationship between inside and outside; every space has a visual, and in most cases a physical, link with the tranquil wooded site in which the school sits. The natural environment is also high on the agenda in the school's construction with the building obtaining a LEED certification.

Planning

The natural setting of the school lends itself well to a 'green' approach to building; large south facing windows capture views but also passive solar gain, rainwater collection from the roof planes is used to create waterfalls in the landscape and deep roof overhangs prevent overheating in summer whilst providing sheltered external learning areas. In addition the building is naturally ventilated throughout, interior finishes are free from Volatile Organic Compounds (VOCs) to create a healthy learning environment and natural or recycled, locally sourced materials have been used where possible. The building achieved LEED certification in 2009.

The Montessori approach is based around learning in an environment in which a number of physical objects are situated to stimulate natural instincts and self-directed learning in the children. The teacher or 'guide' is an observer who can manipulate this environment to encourage the children's natural responses. The 'one room schoolhouse' at The Children's School is a direct response to this method, allowing both easy observation of the children and manipulation of the environment. The large open spaces created in the new building can easily be adapted to create different situations with lightweight, low levels units that can be moved to demarcate different zones allowing spaces to be used for large group sessions or smaller, more focused activities.

The open plan nature of the new school buildings and the large amounts of glazing in both the walls and the roof allow the mature woodland that surrounds the site to be seen from every space within the building. Externally timber cladding has been used on walls and the soffits of the projecting roofs. In places these timber soffits continue internally and help to blur the boundary between inside and outside. The building is single storey throughout meaning the shifting roof planes that help to define internal space are also expressed externally and help to break down the volume of the building in its natural setting.

Whilst the school is conceived as 'one room', the architects have created some delightful and intimate spaces at various points. For example in one corner a small library is nestled under a low roof plane with an inbuilt seat tucked below a window between the bookshelves. In another area one whole wall is covered in white board surface providing a place where the children can gather with a teacher, without a white-borad becoming the focal point in the room towards which everything is orientated.



Plate 4.24 Main entrance

(source: Autism children centre)

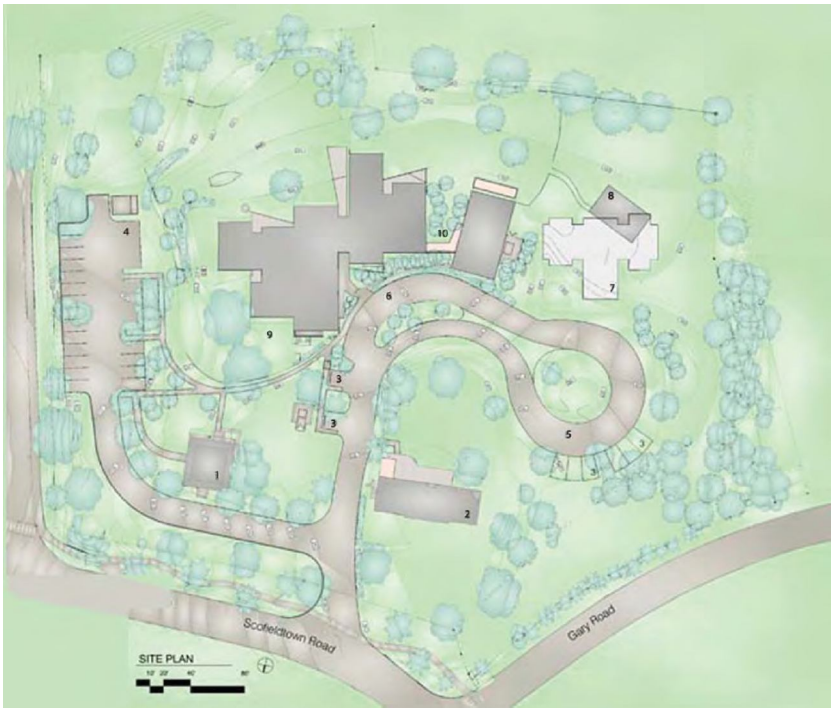


Figure 4.4 Site plan

(source: Autism children centre)

SITE PROGRAM

1 existing house-small meeting rooms

2 existing house administrative offices

3 visitor parking

4 staff parking

5 line up area

6 drop off/pick up

7 previous school location

8 art barn

9 sand area

10 science garden



Figure 4.5 Floor plan

(source: Autism children centre)

PROGRAM

1 Child dropoff & pickup

2 Front entry porch

3 Entry

4 covered outdoor play area addressing playground

5 south facing playground

6 science garden

7 sand area

8 core: greeting area

9 recessed “forum”

10 ages 2-5: learning area

11 ages 2-5: blocks, gross motor

12 ages 2-5: science & art area

13 ages 5-8: learning area

14 ages 5-8: science & art area

15 library area

16 gallery

17 gross motor & lunch area

18 dance, music room

19 front office, “gatekeeper”

20 director’s office

21 tutoring area

22 faculty room



Figure 4.6 circulation plan

(source: Autism children centre)

red: main circulation

blue: volume grid



Figure 4.7 Building zoning

(source: Autism children centre)

private vs public



Figure 4.8 Elevation view

(source: Autism children centre)

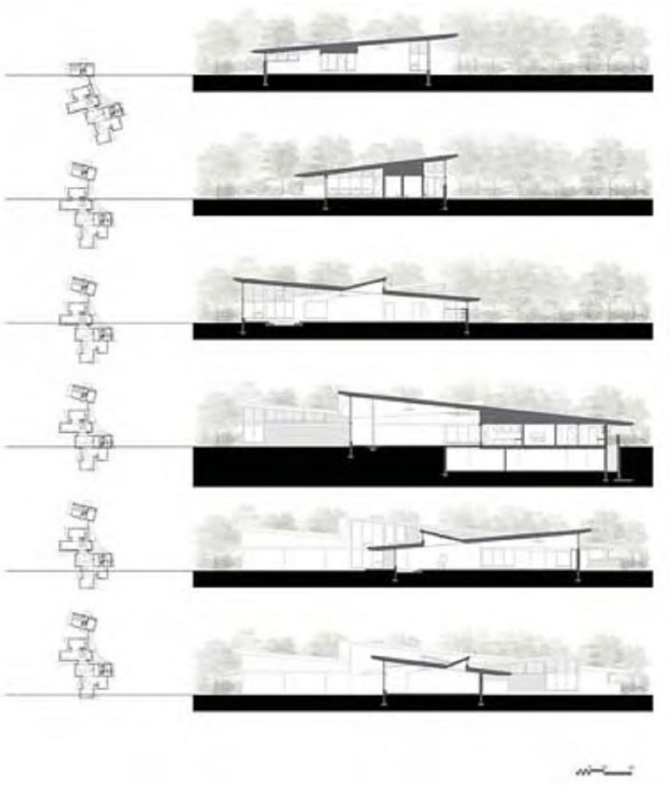


Figure 4.9 Elevation view

(source: Autism children centre)



Plate 4.25 Science garden

(Source: Autism children centre)



Plate 4.26 East view

(Source: Autism children centre)



Plate 4.27 Interior east

(Source: Autism children centre)

4.7 Summary of Case study findings

i. The requirement to provide an ordered and comprehensible, spatial structure

ii. The requirement to provide a mix of large and small spaces

iii. C The requirement to provide increased control of the environmental conditions to the user

iv. The requirement to provide for different, autism specific teaching methods

v. The need to balance security and independence

vi. The need to provide simple and reduced detailing

vii. The requirement for the end user to be actively involved in the brief-building and design process

viii. Appropriate use of technology to aid the learning experience

CHAPTER FIVE

THE SITE

5.1 SITE DOCUMENTATION

Kaduna state, being the capital city of the north central states, its centrally located in the northern part of Nigeria and bounded with the following states; Niger state, Zamfara state, Katsina state, Kano state, Gombe state, Nassarawa state and the FCT Abuja. The site is at the altitude of approximately 600m

Kaduna state lies between latitudes 9°03'N and 11°32'N, and extends from the upper River Mariga on 6°05'E to 8°48'E on the foot slopes of the scarp of Jos Plateau (Udo, 1970). It is bordered by Zamfara, Katsina and Kano states to the north, Niger and the FCT to the east, Bauchi and Platue states to the west and Nassarawa state to the south.



Plate 5.1 Map of Nigeria showing location of Kaduna State

(Source: www.google_images/kaduna state/2010)

5.2 Site location:

The site is located inIgabi local government Area of Kaduna state, northern part of Nigeria. It is situated in eastern part of Kaduna metropolis, within the New Kaduna city called Makarfi New Layout.

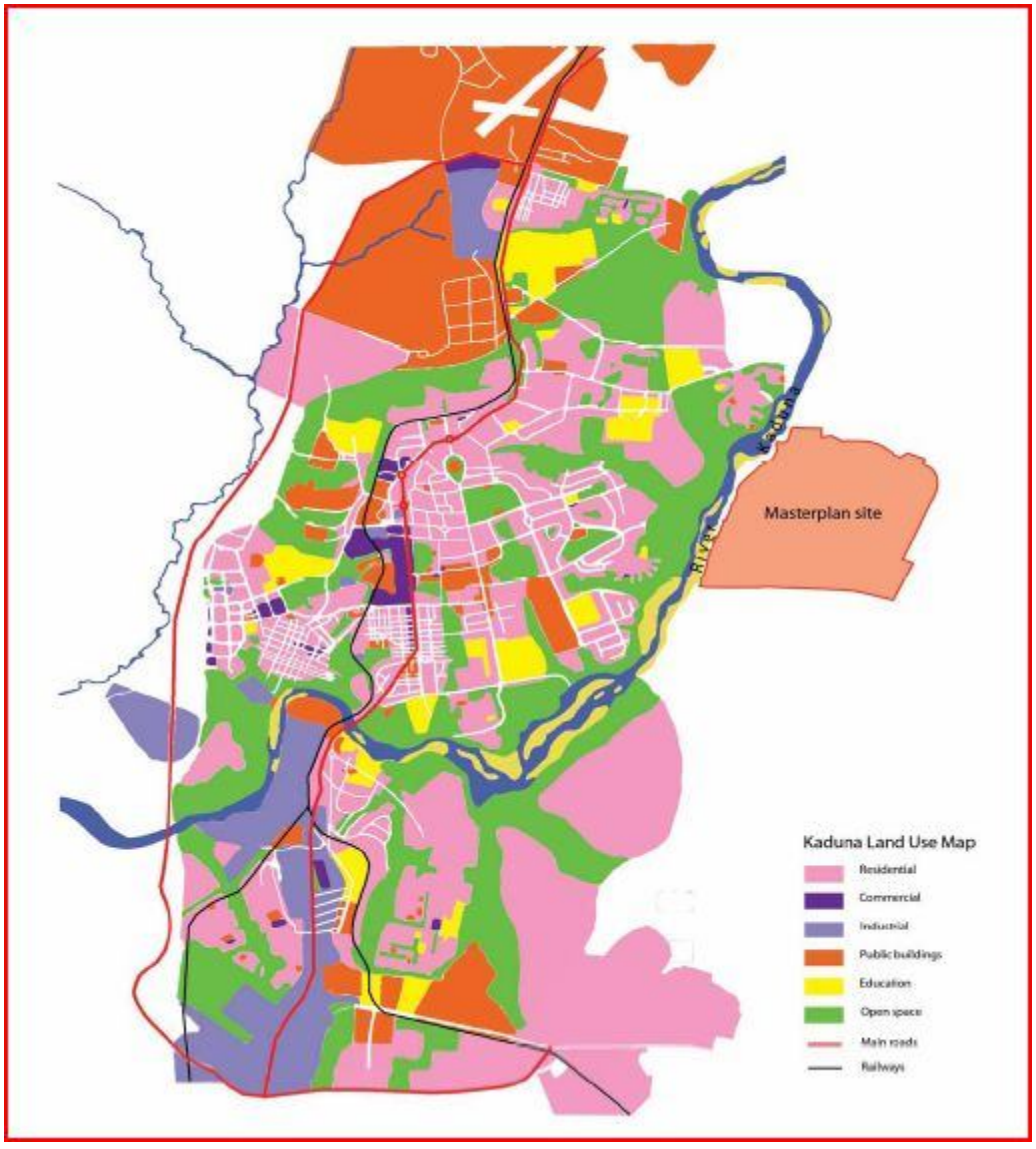


Plate 5.2: Kaduna Land use map in relation with new Kaduna city

(Source: Final master plan report 2008)



Plate 5.3 Satellite image of the site and its surrounding environment

(source: Google earth images 2010)



Plate 5.4: The Site

(Source: Author, 2011)

5.3 Climatic data of Kaduna city

The climate of a place is the average weather conditions over a long period of time, the weather of a place which brings changes in the condition of the atmosphere at a particular time in a particular place is described in terms of its temperature, relative humidity, rainfall, winds and sun shine hours. The climate thus plays an important role in the design of building in terms of orientation, materials or for building envelope, the roof type, the drainage pattern and effects of wind pressure.

A comfortable living environment will depend on maximizing the aspects of environment which reduce heat and the effect of humidity, and protect from rain and dust. Planning with climate should take place at all scales. While detailed climatic information is not yet available,

extrapolations from existing airport meteorological stations have been used to develop the basic description of climatic parameters in the site selection report.

Igabi local Government by virtue of its situation in Northern Nigeria, share the same peculiar climatic elements found in the region. It is located in the tropical hinterland of Nigeria with a recognizable wet seasons extending from May to October and a dry season from November to April. The two seasons are determined by the prevailing wind regimes. From the months of November to April is the North East trade wind. This wind brings with it dust laden dry, cold and often strong winds called Hamattan. Its origin is the Sahara desert and it prevails over Northern Nigeria for the better part of the dry season.

From the months of may to October, prevailing wind regime is the south west trade wind. The wind is characterized by hot and moisture laden air and it carries with it rainfall.

5.3.1 Temperature and Relative Humidity

In human terms, net radiation is felt as air temperature the response to which is influenced by humidity conditions in the air. In Kaduna, the temperature is highest in April and ranges between 95°F and 55°F when there is little or no cloud cover in the sky. During the rainy reason, the maximum temperature is lower due to the dense cloud cover. Temperature falls in the afternoon to as low as 20%.

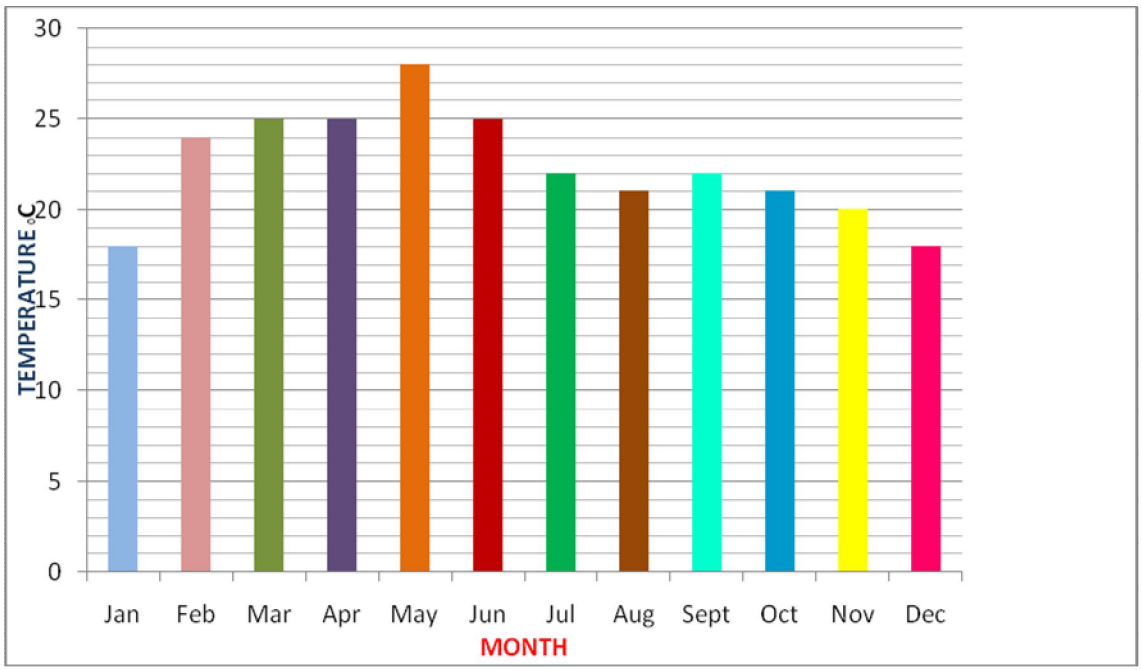


Figure5.1: Average Air temperature chart over ten years

(Source: www.nigeriagalleria.com*)*

This low relative humidity couple with the high afternoon temperatures account for the desiccating effect of the dry season. In the rainy season the relative humidity is much higher especially in the morning hours when it can reach as high as 95%. Even though the temperature is slightly lower, this effect is a heat trap, which causes a general feeling of discomfort in human body.

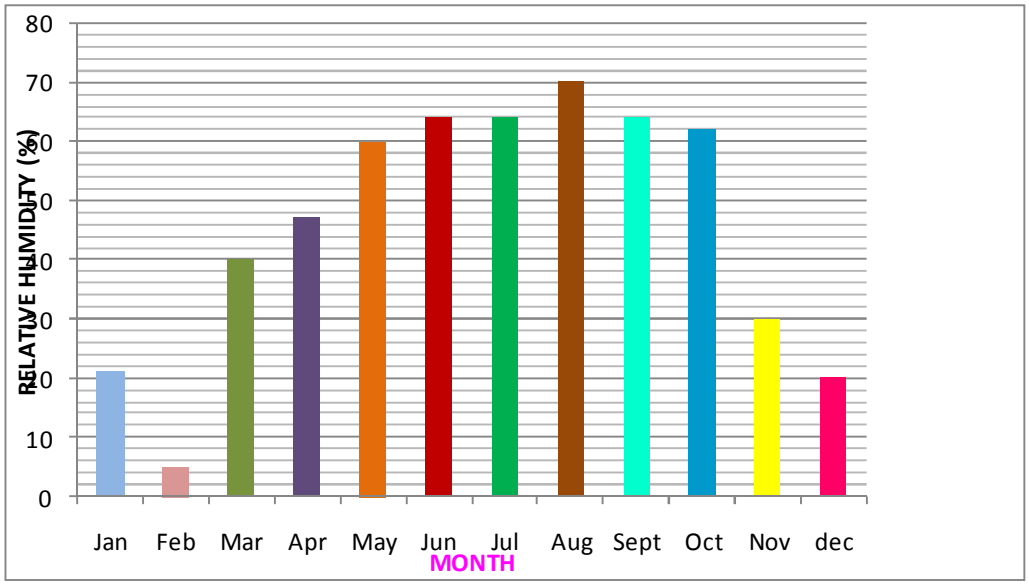


Figure5.2: Average Relative humidity chart over ten years

(Source: *www.nigeriagalleria.com*)

5.3.2 Rainfall

The Rainfall in Kaduna usually starts around the month of April and continues through around October. This implies that the rainy season is between 180 to 190 days per annum. The six month rainfall supplies a mean monthly distribution that shows a tendency for concentration of rainfall shows the need for a drainage system that can evacuate large volumes of water very quickly. Intense rain may last for up to one hour and is then followed by drizzles for several hours. This condition is then replaced by a few days of bright, clear skies. It is most common in the late afternoon at the beginning and ends of the rainy season. The rainfall regime is the result of the convergence of the cool, moist, south-westerly air mass (monsoon) and the dry, hot north-easterly air mass (Harmattan).

5.3.3 Wind

Based on climatological records from Kaduna aerodrome weather station 1980-2006, two major air masses dominate the climate of northern Nigeria. They are tropical maritime air mass (monsoon) and the tropical continental air mass (Harmattan).

The monsoon: This is a moist, cool, air mass with the long history of sea tracking over the South Atlantic Ocean. It is south westerly in direction and has a small decrease in temperature with height. This is associated with the set season.

The Harmattan: - This is a dry and hot air mass with a large decrease of temperature with height. It is a long history of desert tracking before reaching Kaduna as a north-easterly wind. The harmattan wind is developed over Sahara desert and is therefore warm, dry and blows in the opposite direction (North-east to south-west). This is associated with dry season in June the northerly flow of air component has weakened and only the southerly flow predominates. Being moisture laden, it brings about a lot of rain. In September, the tropical continental begins to intensify over the territory and the north-east trade becomes the dominant wind from October to March bringing with it dry, cloudless but dust laden conditions.

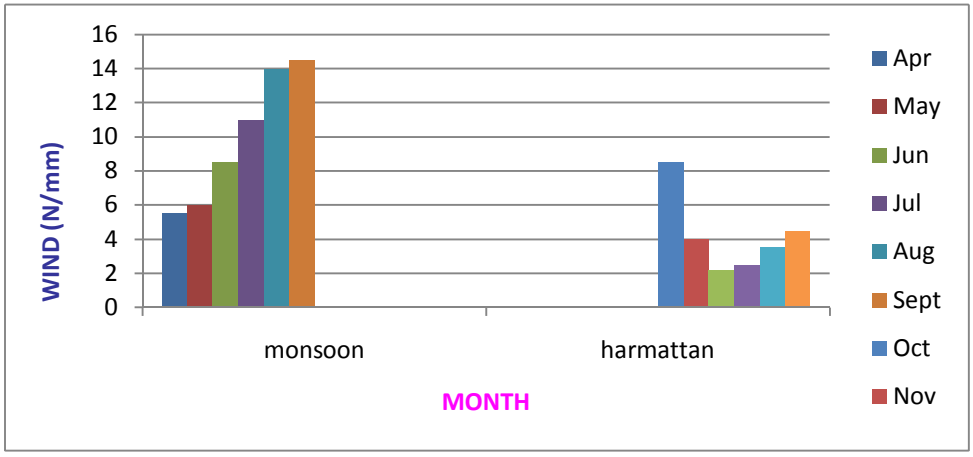


Figure5.3: Average Wind chart over ten years

(*Source: www.nigeriagalleria.com*)

5.3.4 Sunshine hours and Cloud cover

Kaduna metropolis is exposed to about 2,500 hours of sunshine annually. During the dry months -November to April, the monthly variation in the amount of sunshine follows the general trend of an increase from over 275 hours in the area (approximately 9.2 hours per day). Basically, there is a general decrease in sunshine hours as rainy season progresses and an increase in sunshine hours as the rain slowly diminishes.

Variable	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Insulation, kWh/m²/day	5.66	6.49	6.72	6.63	6.41	6.03	5.44	5.03	5.47	5.76	5.80	5.40
Clearness, 0 – 1	0.65	0.69	0.66	0.63	0.61	0.58	0.53	0.48	0.54	0.60	0.66	0.64
Temperature, °C	23.31	25.17	27.67	27.36	26.11	24.61	23.63	23.56	24.22	24.95	25.65	23.87

Wind speed, m/s	3.99	3.86	4.30	4.31	4.21	3.60	3.43	3.24	2.96	3.17	3.69	4.17
Precipitation, mm	0	1	7	56	120	160	218	275	243	71	2	0
Wet days, d	0.1	0.1	0.7	3.6	8.2	11.8	15.3	16.8	13.8	4.6	0.0	0.0

Figure 5.1: Kaduna, Nigeria- Solar energy and surface meteorology.

(Source: NASA Langley Research Center Atmospheric Science Data Center; New et al. 2002)

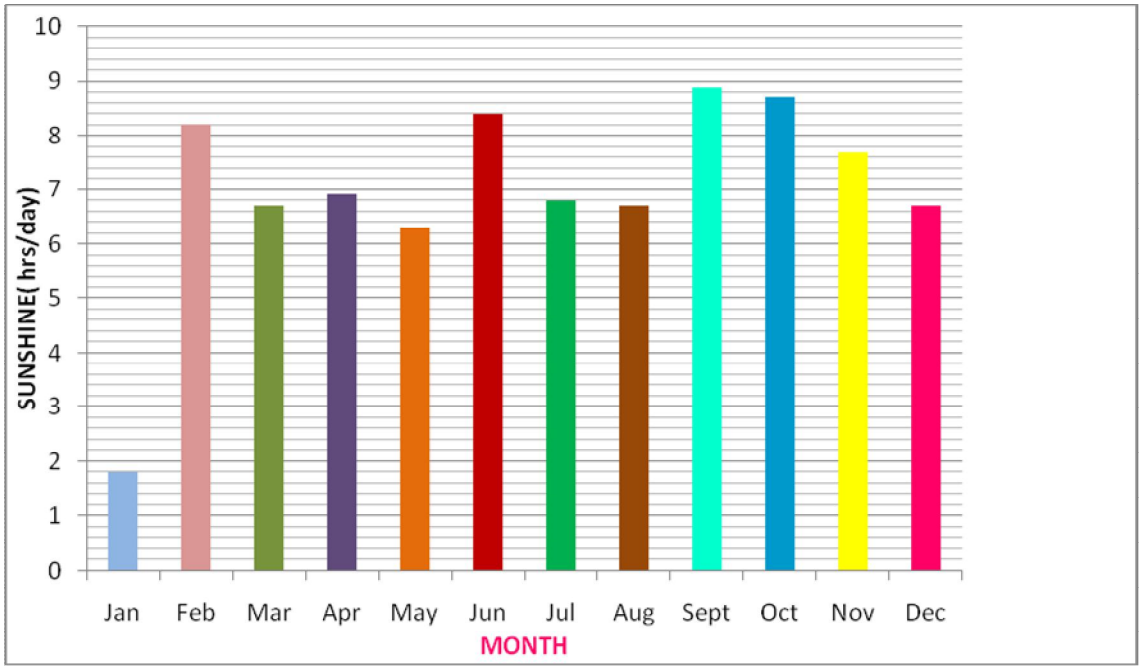


Figure5.5: Average hours of sunshine per day over ten years

(*Source: www.nigeriagalleria.com*)

5.4 SOIL, TOPOGRAPHY AND DRAINAGE

The soil in the study area are general to the northern plains and are of laterite formed from drift deposits which mantle the solid sedimentary and pre Cambrian basement (granite). the soils is typical red-brown to red-yellow tropical ferruginous soils and savannah grassland with scattered trees and woody shrubs. The soils in the upland areas are rich in red clay and sand but poor in organic matter.

Topographically, the area consists of, in some parts, a rolling park-like terrain with little relief situated about 100ft above and below the 200ft contour line, while in some other parts it tends to be gently undulating, in some other arts gentling sloping towards streams and also in some others are found massive rock outcrops if magmatic origin.

The sub-soil provides good drainage and proper base for simple and economical foundation for building and supports vegetation at the same time.

5.5 SITE SELECTION CRITERIA

The choice of site for the proposed design was influenced by its possession of a better part of the following qualities.

i. Quiet and conducive atmosphere for learning

ii. Relatively flat site in consideration of the target purpose

iii. Proximity to ancillary facilities e.g. electricity, water mains.

iv. Easily accessible to pedestrian and vehicular traffic

5.5.1 Site Selection criteria

The site adopted has been carefully analyzed, with some factors taken into consideration to determine its potentials and the purpose and magnitude of the project. The suitability of the site was analyzed using the following criteria.

i. Physical criteria

The physical criteria considered include the geology and soil, topography and drainage, vegetation and land availability.

- ✓ Geology and Soil: - The types of activities and structure to be put on a site will determine the suitability of that soil for that purpose. The structural integrity of any complex is closely related to the soil/rock bedding, which should be able to bear the proposed land use. In this case, the lateritic soil nature of the site renders it suitable for even the most advanced structural composition. The topsoil is permeable and will permit fast and easy water penetration/drain, thus preventing pools of water gathering around the site. The site is also blessed with vast open spaces around it which provides a suitable excitement and natural feeling to the children.



Plate 5.4: Soil type of the Site

(Source: Author, 2011)

- ✓ Topography and Drainage: - The site is gently slopes towards the south western corner. This makes it gently sloping towards streams.



Plate 5.5: Site drainage

(Source: Author, 2011)

- ✓ Vegetation: - The vegetation of the whole surrounding can be characterized as lush green with trees and shrubs which are spread all over. The flatten area viewed from a far give it an ever green look. The vast land which when landscaped will look very attractive and suitable for a rehabilitation site in view of the therapeutic and healing effects of landscape on the autistic children.





Plate 5.6: Site Vegetations

(Source: Author, 2011)

ii. Vegetation

- ✓ Land Availability: -The site chosen is a virgin land it is located a few kilometers away from the surrounding neighborhood and there is enough room for future expansion. There will not be any need to demolish any structure or to pay compensation for structured destroyed.

iii. **Environmental criteria**

The nature of the overall environment is very crucial to the type of development within an area. In this case, the site is located in a strategic location within a mixed land use area, which is a plus to the location of the centre. The site also happens to be bounding with vast open spaces which will support the private and sedentary atmosphere required by the occupants.

Another plus to the selection of this site is its strategic location off the primary road and the ring road that surrounds the entire district coming from Kaduna city. All the sides of the site are bounded by roads which include a secondary road for easy access, an arterial road for convenient access off the highway.

iv. Man-made features

The man-made features include factors that have been put in place through the activities of men, which affects the suitability, or non-suitability of the selected site. They include public utilities, services and accessibility.

- ✓ **Public utilities**: -

The site chosen is located in a place where adequate public utilities that can encourage movement of people to the area are available; which includes good road network.



Plate 5.7: Site Access road

(Source: Author 2011)

- ✓ **Services:-**

The site is bounded by very good services such as electric power line and a network of telephone communication, which makes access to them easily obtainable. There is also a good drainage system and very good method of solid waste disposal.

5.5.2 Site Justification

- ✓ This site is located in Rigachikun area of Kaduna state.
- ✓ The site is large enough to accommodate all the facilities required in the rehabilitation centre and also to cater for future expansion when the need arise.
- ✓ It is located along Kaduna Zaria road which makes it easy accessible from all parts of Kaduna and neighboring sates.
- ✓ The site is located far away from industrial zones and therefore safe from environmental hazards.

- ✓ The site is well connected to infrastructures such as good road network, electricity, water-supply and telecommunication systems

5.6 Site Analysis

The site has been analyzed and some of the constraints have been identified so that proper planning and design could be achieved. The site analysis was based on the: topography, geology, climate, vegetation, together with their associated elements.

- **Topography**: The site is relatively gentle sloping with good natural drainage to the existing river. The soil type is of good bearing capacity which can be able to withstand the weight of the proposed hospital complex.
- **Geology**: The site has good topsoil judging from the farming activity on it. It also has a rocky terrain along the river.
- **Climate**: Two different type of air masses passes through Kaduna, one from the north mostly dry and dusty (continental in origin) blowing from the sahara desert called the north-east trade winds and the other from the Atlantic in the south, brings rainfall, mostly cool and desirable for human comfort.
- **Vegetation**: The vegetation on the site consists of scattered trees of different species and few shrubs. Site is used as a farm land during the raining season.
- **Temperature**: Fluctuations in daily November temperature are from 16ºC to 32ºC clear skies, visibility becomes poor and the sun rays do not reach the surface, thus lowering the minimum temperature to 14ºC in January. Nights and mornings are cool but temperature increases 14ºC to 31ºC giving a variation of 16ºC which is the highest

during the year. Maximum temperature occurs in April which reaches 35.9ºC but generally does not last more than two to three months.

- **Relative Humidity**: At the beginning of dry season, relative humidity falls from 68% in October to 36% in November with the stabilization of the easterly winds. It further falls to 35% in January and 20% in February. Mean relative humidity reaches its maximum value of 80% in the month of August.
- **Sunshine**: November sunshine hours vary from 8.9 to 9 hours per day. January sunshine hours are quite high, 8.7 to 9.5 hours. Minimum sunshine hours per day occur in August with as low as 5.1 hours per day.
- **Rainfall**: Rainfall starts in April and increases from 161.5mm in June to 281.6mm in August which is maximum in the year. Annual total rainfall lies within a range of 960mm to 1150mm.

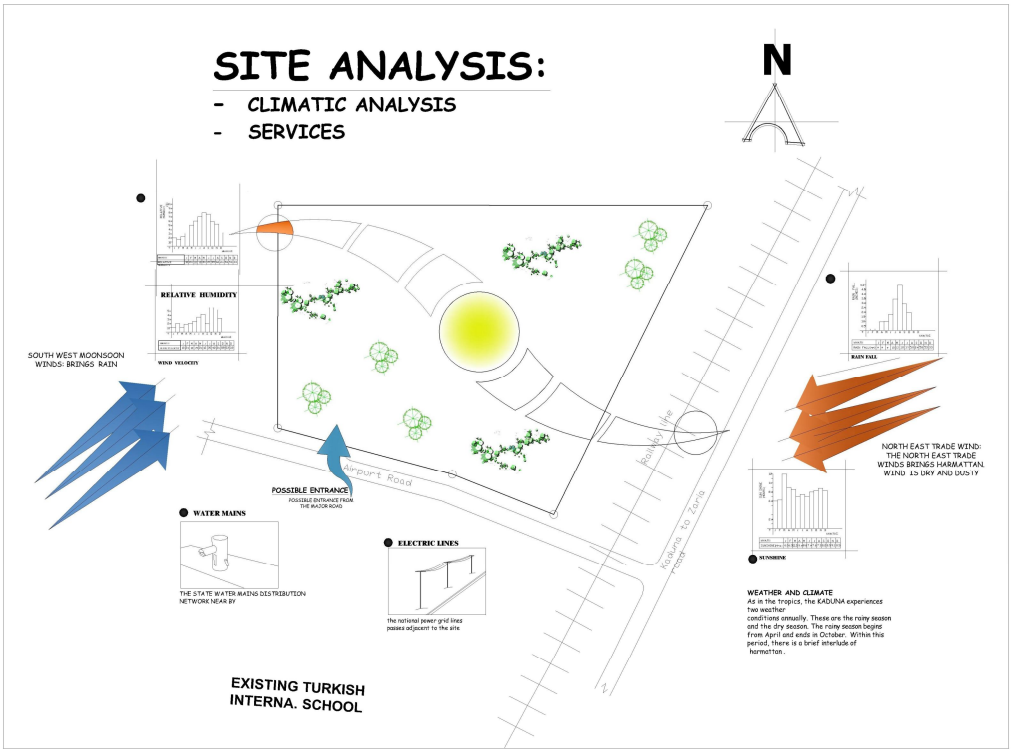


Plate 5.8: Site Analysis

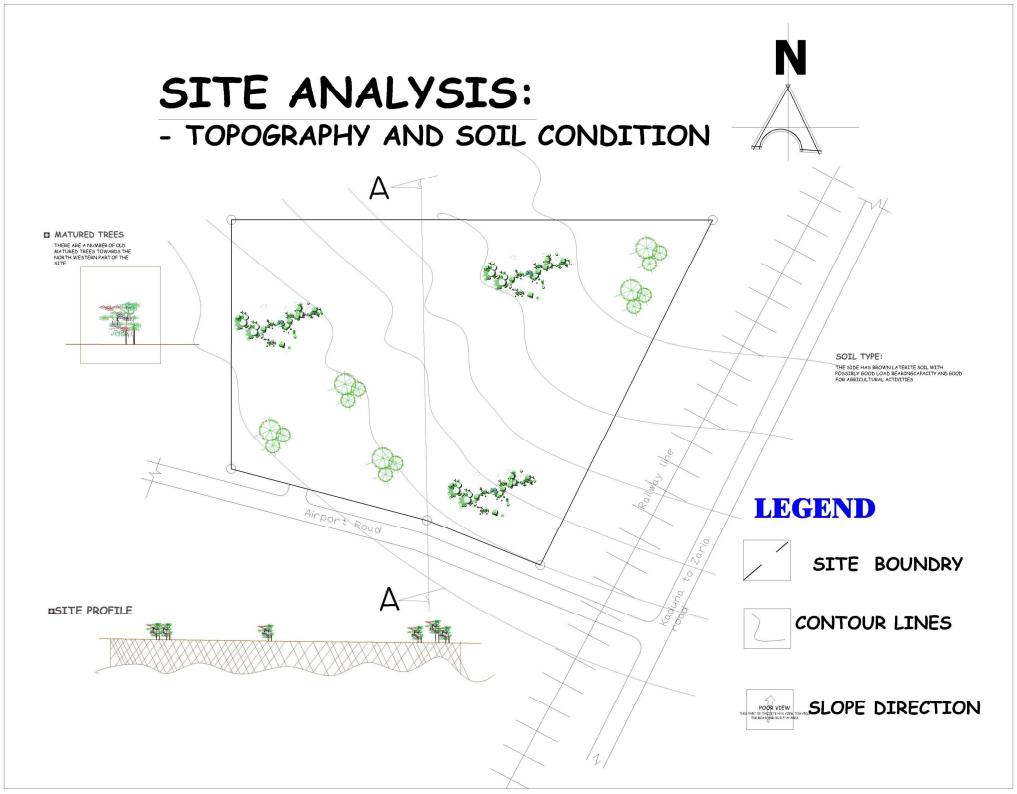


Plate 5.9: Site Analysis

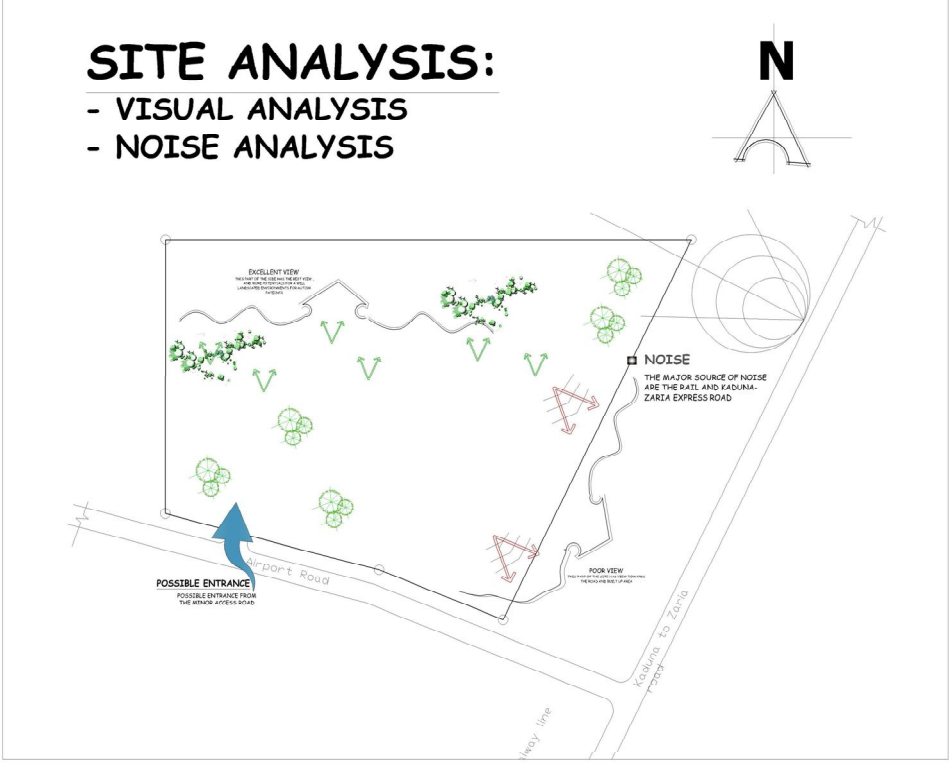


Plate 5.10: Site Analysis

5.4 Services available on Site

The site will be accessed through Kaduna Zaria high way. Power can easily be supplied to the site from the 33KV/11KV PHCN sub-station in Mando which is a few kilometers away. Also, water supply to the proposed site can be connected directly from the existing main-water supply line. There is good GSM coverage and telephone lines could easily be connected from the proposed layout telephone line.

CHAPTER SIX: DESIGN REPORT

6.1 THE DESIGN BRIEF

The proposed rehabilitation centre is a commission to evolve an institution where persons with ASD in Kaduna and neighbouring states can have an avenue for acquiring skills towards sustaining an enduring livelihood. The centre focuses on designing Autism friendly environment that can act as mitigating factor which is not intimidating, scary, depressing or boring to the end users.

6.2 Potential clients and users

The proposed Rehabilitation Centre is a project expected to be implemented by Kaduna state government. This thesis design proposal is projected to cater for children, both male and female, of rehabiliitable age i.e. 4– 18 years with Autism Spectrum Disorder from the state capital, local government areas of the state and neighbouring states.

Schedule of accommodation

Entrance

Lobby

Security/Information

Restrooms

Administration

Director

Staff

Facilities Management

Lounge area

Storage

Classrooms

Small rooms

Large rooms

Gym/Multipurpose

Cafeteria

Kitchen

Exterior Delivery

Library

Interactive Spaces

Physical Therapy

Playroom

Exterior Spaces

Playground

Courtyard

Storage/Services

6.4 ZONING CONCEPT

Zoning is an important factor to be looked into in designing any building. This is necessary so as to have defined location for various activities. Zoning is the most important aspect of the design and should be given due consideration. The zoning in this kind of building is done under three headings; public spaces with the highest frequency of usage and users, semi public facilities with a moderate frequency of usage and finally the private zone, basically the accommodation unit. The facilities have been separated accordingly.

Public facilities were located at the entrance which is far away from the accommodation units. Facilities at the public include the reception, clinic, dinning and assembly hall, vocational facilities and recreational facilities.

At the non-public zone are classroom, bedrooms, and ancillary facilities. These are located at the rear side of the site away from the public..

This proposed rehabilitation centre can be categorized into three main zones: Private, public and services.

Private spaces:

i. Sleeping area
ii. Library

Public spaces:

i. Parking area
ii. Reception
iii. Classrooms

iv. Clinic

v. Dinning/Assembly Hall

vi. Sensory gym

vii. Outdoor areas

viii. Art

ix. Craft

x. Music

Services

i. Kitchen

ii. Offices

6.5 DESIGN CONCEPT

The concept of the design was adopted from the traditional building forms found in the state. The traditional form concept and its arrangement whereby buildings surround courtyards were considered. This is to reflect on the traditional set-up in order to give the building an informal setting and the need for simplicity and ease of coursing injury in the usage of the building. This evolved in curved walls, which eliminates sharp turns, the use of specific colours and elimination of corridors which provide visual connectivity between facilities

6.6 SITE PLANNING

Site planning is an important aspect of design. The site is planned to accommodate flexibility of usage. This was achieved by separating the facilities so that each can function on its own without another one interfering and also not jeopardizing the relationship of one from the other. The site was also planned in such a way that from the entrance gate, one can visually see a kind

of balance and the asymmetry in the centre and a distinctive main entrance into the main building was not left out. Vehicular and pedestrian circulations were separated for reasons of safety.



Plate 6.1 Floor Plan on site

a. Roads and parking

The site is accessed from one entrance and exit point for security reason. The parking spaces cater for both staff and public. This parking is at the entrance from the gate house, while the

trucks that have come to off-load goods and on-load goods have their bay at the opposite side of the main parking. The site has been planned in such a way that there is flexibility of the structure. There is separation of vehicular and pedestrian movement which reduce accidents. The public parking extends to the vocational centre for delivery of goods.

b. Internal roads and circulation

The internal road is composed mainly of the paved pathways, which inter-connects all facilities within the site. All pathways are equipped with curbs, handrails and top covering to provide refuge from the elements. Handrails are installed on both sides of the pathways and are composed of vertical and horizontal members.

Sharp ninety degree edges are avoided at intersections and junctions with the introduction of curved edges, whilst level changes are absorbed with ramp installations.

c. Landscaping

Plants form the primary landscaping element within a variety of scale, texture, colour and shape. Trees are used sparingly within the built up sections of the center facility, so as not interrupt lines of vision, but are used around perimeters to form a buffer zone , provide aesthetics and control the micro climate in the site. Shrubbery is planted closer to the facilities and around pathways, as against trees in order to avoid outgrowing roots from damaging structures and leave-shedding which might constitute a hazard to the building.

Courtyards also form part of the landscaping elements used in the center. The courtyard scheme is a major element in Hausa architecture, and a means of solving problems of ventilation and lighting. Enclosed and open courtyards are incorporated in the proposal, which are properly landscaped with shrubs and flowering plants to create a homely environment, provide visual interest and articulate the centre.

d. Building forms

The proposed design is composed mainly of curvilinear forms to avoid injuries to the users and give the building a non institutional setting.

e. Orientation and fenestrations

Orientation and fenestrations are aligned and positioned to take optimum advantage of sun paths and prevailing wind direction to properly light and ventilate the used spaces

6.7 DESIGN COMPOSITION

a. Administrative block

. The entrance of the buildings marks the transitions from the exterior to the interior spaces. Since the lobby will be experienced by both students and the general public, it should celebrate the significance of the architecture but recognize its purpose in the centre. This area will remain open to provide for a dynamic space which unites the different programmatic elements into a harmonious architecture.

The administration serves to regulate and oversee the entrance and lobby space. It is the filter to the outside community and has an incredible influence on the development of the students. It will be important to formally stress the significance this programmatic element has within the

building. This area will house the faculty offices and other administrative functions. The administration will also function as the link between the different portions of the campus.

b. Medical unit

The medical unit is composed of a waiting area, resting area, dispensary, two consulting rooms, one examination room and a nurse station. Situating the medical unit in the administrative block to facilitate quick attention to rehabilitees admitted at the centre as medical intervention is the first step of the rehabilitation process.

c. Vocational complex

The vocational complex includes: Music rooms, Art and Craft centre and exhibition space.

d. Lecture facilities

The classrooms are the true heart of this project. They include the spaces where students receive the attention they need as part of their development. These spaces are where the crucial learning and advancement of the student's writing, verbal and communication skills occur. These classrooms, although incredibly influential cannot help these students alone. It is a team effort, meaning these rooms need to work closely with the administration to assure that these students receive the proper communication and education they require. In addition, these spaces will intermingle with therapists to provide as well rounded of an education as possible.

e. Cafeteria

This space is intended to give the students a comfortable opportunity to mingle with each other on a more personal level. It is anticipated to be an open space which accommodates the students, faculty and members of the centre. It could become a space for faculty to observe and gauge student's ability to interact on a social level and become a crucial part of the student's

development process. The space is also used for other functions like assembly meetings and other functions. Movable partitions are used when necessary to partition.

f. Library

The library is an area used by the students based solely to educate and inform. As this project intends to design a development facility, the library would house updated information and would become a key component within the building. Students could enjoy a quite learning environment while they read and begin to learn through the power of books. The library will also functions as one of the strongest source for information pertaining to autism.

g. Interactive spaces

These spaces serve similar purposes as the exterior spaces, except indoors. Students would be allowed to play on the floor and on mats and physical activity would be a priority in these spaces. A focus on the development of logics and coordination would occur as children begin to play with toys and games. These spaces would also allow for the faculty to observe the children and interact with them on a different level.

h. Exterior spaces/ Ancillary units

This refers to a variety of unique spaces which serve to encourage students to interact and play. Nature is very vital to children because it allows them to experiment and develop specific motor skills and various coordination skills. These outdoor environments would also promote interaction with nature. Since they are under the supervision of professionals, these experiences could be extremely influential on their development as children.

Ancillary units provided for the proposed centre includes; sporting facility, which includes a basket field, running track and volley ball pitch and various facilities for different play and games such as swing, slide e.t.c.

i. Storage/services

These spaces would store all information and files on the students and medical data. This portion would also include storage for the cafeteria and load/unloading of all goods for the medical facilities and vocational section respectively.

j. Hostels

A hostel block is made up of 3 units. The units are connected by a walkway which can be accessed from both flanks. The hostel units are three in number, one for the girls, one for the pupils aged 4-9, while the other is to accommodate the big boys aged 10-18. The units for the boys are double storey to accommodate the higher ratio of the boys to the girls. The classrooms are attached to each unit for easy access and supervision with a play area.



Plate 6.2 Floor Plan

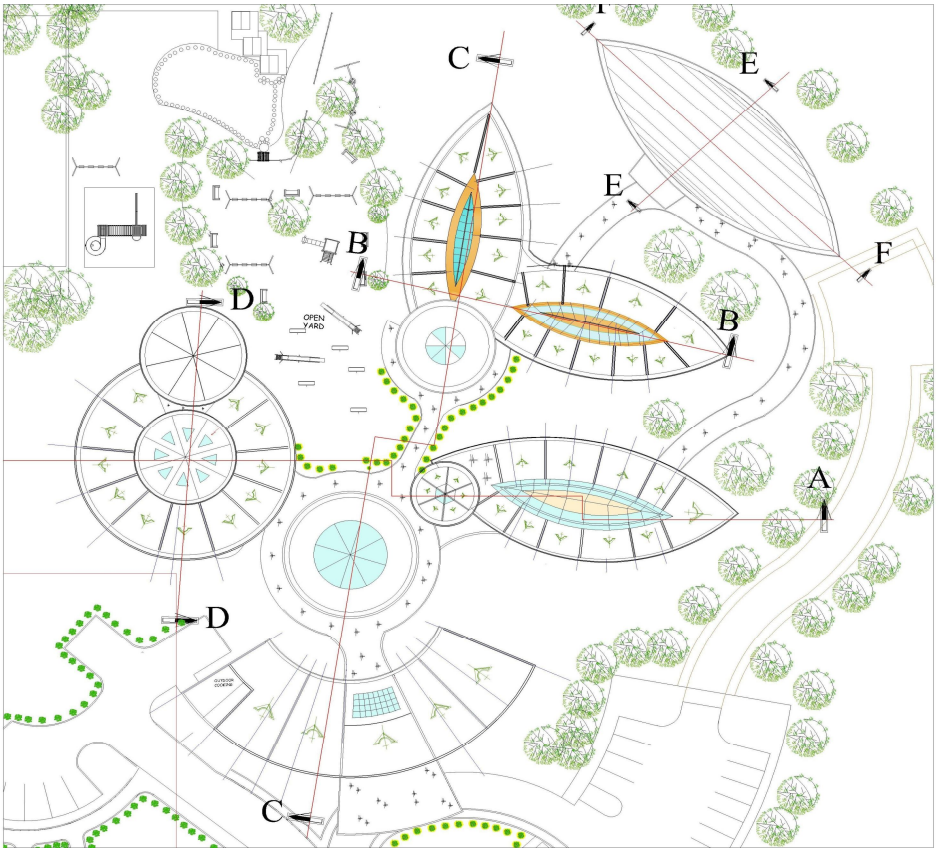


Plate 6.3 Roof Plan



NORTH VIEW SITE ELEVATION



WEST VIEW SITE ELEVATION

Plate 6.4 Elevation on site

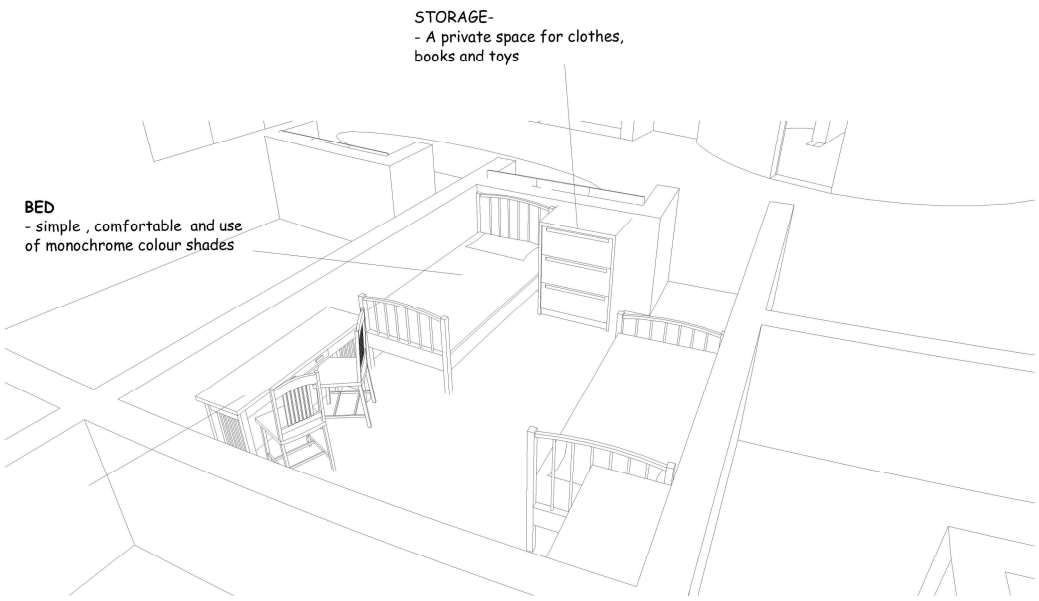


Plate 6.5 3D View of typical Bedroom



Plate 6.6 A 3D View of play ground

6.8 SERVICES

Services include access, parking and circulation, electricity, water and drainage, communication system, air-conditioning and ventilation. Without these, the level on activity in the centre may not exist.

6.8.1 Access

There is one vehicular access road in and out of the centre. It is so planned for security reasons so that entrance into the centre and exit out of the centre is being watched and the trucks that brings goods and take goods out are also being watched at a time.

6.8.2 Parking Lots and Circulations

The parking is arranged in such a way that there is a direct link between the parking lots and the various facilities. The interference between the vehicular and pedestrian circulation is reduced by walkways at the parking lot.

6.8.3 Electricity and Telephone

There is an easy access to electricity supply at the centre; this is due to the fact that there are electricity poles which are situated at centre of the road where the access road is being tapped from.

6.8.4 Water Supply

Water supply in the complex is very important, as water is a necessity in every day activity. The water supply can be tapped from the already existing water supply. Public taps however are at the green areas.

6.8.5 Drainage

Two main types of drainage take place in the building. The first is the rain water drainage from around the site and the roof gutters. The second is the sewage or soil water drainage. Water spouts are provided to drain the rain water down to avoid spoiling the elevation views. At the ground level, proper drainage are provided round the whole centre. Septic tanks and soak-away pits will be used. The sewage collection chamber will be equipped with treatment plant to prevent contamination of the environment.

6.8.6 Air-Conditioning and Ventilation

The building will be ventilated by a combination of natural and mechanical systems of ventilation. Natural cross –ventilation is enhanced in all the spaces while mechanical ventilation is by means of slit air conditioners.

6.8.7 Communication system

The centre can be conveniently supplied with telephone because of the already existing telephone lines. All the various units of the centre will be connected to an intercom system of communication which will be connected to the main communication system of the centre.

SUMMARY OF FINDINGS

The research has comprehensively identified the problems, justified the topic, outlined the aim and objectives, laid out the scope of the thesis, and stated the architectural significance in chapter one. Chapter two of this thesis research has prepared a brief history of Autism; the nature of the illness, characteristics, treatments and the situation of Autism in Nigeria. It has also defined Autism, its classification, and rehabilitation.

The architectural approach to children's needs was dealt with in chapter three, with how architecture have intertwined in turning Autistic children into useful individuals. This is achieved using building forms, colours, lighting, acoustics and the general landscape of the built environment. This chapter concludes with a summary of features of autism friendly environment.

Case studies within and outside Nigeria have been discussed in chapter four, the basis of the selection of the case studies was explained along with the variables under which they have been analyzed.

The site selection criterion was discussed in chapter five explaining the basis for the selection of the site. The merits and demerits of the site was weighed before a logical selection was made, in accordance with the design considerations. The features of the site were then discussed comprehensively with maps and climatic data.

Chapter six discusses the development of a design brief according to the intended scope of the project. The schedule of accommodation was also shown.

The design concept and report documents the general planning of the site and the conceptual development using the prominent building forms, with features and other architectural elements to achieve an autism friendly design.

The proposed project is intended to provide the immediate community and neighboring states with a facility that would enhance the well being of autistic children thereby helping them in achieving their goals as individuals.

CONCLUSION

Throughout this project, it became obvious of how the life of an autistic child differs from others. They view the world around them as something new and exciting; everything is an adventure waiting to be unfolded. Many people rush through life without ever taking the chance to view the environment around them. The goal was to create an environment to help children with autism and make them comfortable within their daily lifestyle. Architecture was used to construct a realm in which these students could explore within an environment which benefited their development. Architecture encompasses the entire world around us and has the ability to direct effect or even change our lives. Partly the way humans act and interact is based on the designed world in which they live. Architecture becomes a starting point in their lives. Architecture comprises so much power over human, especially those with disabilities, such as autism. The interaction between forms, light, sound, colour, landscape and man are all variables in the overall equation of the design and the way that architecture controls these elements is the solution to the equation. This project explored a very fragile topic of architecture, one that many neglect to confront. The reality that every decision an architect makes has a strong impact on the inhabitants.

RECOMMENDATION

This thesis has emphasized on providing the right environment for children with ASD which is not only desirable but it is surely their right. Children with ASD live in a world which is constantly full of negotiations. In order to meet their needs fully, the difficulties they experience within all settings were addressed. This was not restricted solely to creating appropriate learning environment but also extend to creating environment which is pleasant to live in. Environments designed and created specifically for children with ASD clearly have a beneficial impact not only on the children themselves but also upon those who care for them. This intricate interplay and delicate balance between environmental factors and human factors converge to create a space where children can be children, not just children with a disability.

CONTRIBUTION TO KNOWLEDGE

The study was able to establish that:

i. The use of curvilinear walls in the design of Autistic centres can help to improve their conditions as the autistic children walk around the building with their hands on the wall for guidance around the building.

ii. The curvilinear walls also help in preventing injury to the children, thereby making the environment safe and conducive for the Autistic children.

iii. Using specific colours that are neutral and calming can have a positive impart on the life of an autistic child as relates to his environment.

REFERENCES

Albert, B. F. (1978) "*The Effect of Environmental Softness*" upon the Behaviors of Autistic Children. Ph. D. Dissertation in Humanistic Sciences, State University of New York at Buffalo.

Alexander, C. A. (1977) "*Pattern Language: Town Buildings Construction*." .NAew York: Oxford University Press.

American Psychiatric Association. (1994) *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.). Washington, DC.

Anderson, G.M., and Hoshino, Y. (1997) "Neurochemical Studies of Autism" in D.J. Cohen and F.R. Volkmar (eds.), *Handbook of Autism and Pervasive Developmental Disorders* (2nd ed., pp. 344–369). New York: Wiley and Sons.

Beaver,C. (2006). Designing environments for children and adults with autism spectrum disorder. *Designing Living & Learning Environments for Children with Autism*. .

Beaver, C. (2003) "*Breaking the mould*" communication, Autumn.

Bonnie B. H.(2003) Design guidelines of a therapeutic garden for Autistic Children. M.sc thesis Louisiana State University.

Carpenter, B, Chatwin, I, Egerton, J (2001) "*An evaluation of SIECCA: an intensive programme of education and care for students with profound autistic spectrum disorders*", Good Autism Practice Journal, 2 1, 52-64.

Carpenter, B., Conway, S. and Whitehurst, T. (2005) *"First impressions*", Special children, july/August.

Crisp, B. (1999) *Human Spaces: Life-Enhancing Design for Healing, Working, and Living*. MA: Rockport Publishers, Inc.

Eric S. and Robert R.J. (1976) eds. Psychopathology and Child Development. New York: Plenum Press.

Fisher, A.G., Murray, E.A., and Bundy, A.C. (1991) *Sensory Integration: Theory and Practice*. PA: F.A. Davis Co.

Garvey, C. (1977) *Play.* Cambridge, MA: Harvard University Press.

Grandin,T. (1995), Thinking in Pictures, and Other Reports from my Life with Autism. Doubleday, New York.

Harris, S.L. and Handelmen, J.S. (1994) *Preschool Education Programs for Children with Autism.* Austin, Texas: PRE-ED, Inc.

Hebert B. B.(2003) "*Design guidelines of a therapeutic garden for autistic children*"

Humphreys, S (2005) 'Autism & architecture' www.autismlondon.or.uk/pdf-files/bulletin _feb-mar_2005 accessed 21 July 2011.

Marcus, C. and Barnes, M. (1999) (ed.) *Healing Gardens: Therapeutic Benefits and Design Recommendations.* New York: Wiley and Sons.

Martins, O. (2007) Autism in Nigeria:"A *Brief on the Current Situation "* Retrieved April, 2011 from http://www.autism Nigeria.com

Mohammad H. (2010) Rehabilitation centre for persons with physical impairment Gusau. Application of universal design principles. M.sc thesis, Ahmadu Bello university,Zaria.

Moore, R.C., Goltsman, S.M., and Iacofano, D.S. (1987) *Play for All Guidelines: Planning*,

Designing and Management of Outdoor Play Settings for All Children. Berkeley, CA: MIG Communications.

Mostafa,M. (2008) An Architecture for Autism: Concepts of Design Intervention for the Autistic User. *International Journal of Architectural Research iJAR*. Vol. 2 (1) 189-211.

Parker, J.G., and Gottman, J.M. (1989) "Social and Emotional Development in a Relational Context: Friendship Interaction from Early Childhood to Adolescence" in T.J. Brendt and G.W. Ladd (Eds.) *Peer Relationships in Child Development*, pp. 95-131. New York: Wiley.

Rutter, M., Bailey, A., Simonoff, E., and Pickles, A. (1997) "Genetic Influences and Autism" in D.J. Cohen and F.R. Volkmar (Eds.) *Handbook of Autism and Pervasive Developmental Disorders* (2nd Ed., pp. 344-369). New York: Wiley.

Scheuermann, B. and Webber, J. (2002) *Autism: Teaching Does Make a Difference.* Canada: Wadsworth Group.

Schopler, Eric, and Gary M.B. (1986) eds. High Functioning Individuals with Autism. New York: Plenum Press.

Schopler, Eric, and Gary M.B. (1986) eds. Social Behavior in Autism. New York: Plenum Press.

The Child with Autism, (updated may 2008) "*Facts for Families*," No. 11 (5/08) Retrieved may 8, 2010, from American Academy of Child and Adolescent Psychiatry.

Villegas J. (2009) "Living in the Spectrum", Autistic Children Center. Unpublished B. Arch Project. Roger Williams, University. http://docs.rwu.edu/archthese/37

Vogel, C. (2008). *Classroom Design for Living & Learning with Autism*. Autism Aspergers Digest, May/June Retrieved 01-07-09 from http://www.designshare.com/index.php/archives/901

Whitehurst, T (2006) . The impact of building on children with autistic spectrum disorders. In: Jones, G. & morgan, H. (Ed.), Good autism practice.

Whitehurst T. (2006). *Evaluation of features specific to an ASD designed living accommodation.* Sunfield School: Sunfield Research Institute.

Whitehurst T. (2006). *The impact of building design on children with autistic spectrum disorders.* Sunfield School: Sunfield Research Institute.

WILLIAM R. C. (August 1994) A school for mainstreaming autistic children. Unpublished M. Sc thesis. Texas Tech, University.

Wolfberg, P.J. (1999) *Play and Imagination in Children with Autism*. Teacher College Press.

The National Autistic Society (http://www.nas.org.uk/)

The Autism Society of America (http://www.autism-society.org)

Autism Speaks (http://www.autismspeaks.org)

Cure Autism Now (http://www.cureautismnow.org)

Autism Associates (http://www.autism associates .org)