DESIGN GUIDELINES FOR SPECIAL EDUCATION SCHOOLS FOR CHILDREN WITH AUTISM
DESIGN AND APPRAISAL OF PRIVATE İLGİ SPECIAL EDUCATION SCHOOL

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

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ABSTRACT

DESIGN GUIDELINES FOR SPECIAL EDUCATION SCHOOLS
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Autism is a pervasive developmental disorder that is seen more and more in the society and it significantly affects the lives of not only those who have autism but also their families and close ones. There is no known cure for autism, the most effective treatment is education. The choice between the several approaches regarding the education of autistic children is shaped according to education choices, children's age, the severity of symptoms and children's intellectual capabilities. The thesis focuses on the architectural design of special education schools among other education opportunities. The aim is to draw architectural guidelines for the design of a special school for children who are diagnosed with autism and who require special education support. These architectural guidelines are hoped to aid architects who will work with similar architectural programs in the future. The study concludes with an appraisal of the design of Private İlgi Special Education School, realized by the author of this thesis and architect Kadri Atabaş. In the light of information gathered during the study, the preliminary design is evaluated. Suggestions are offered concerning the architectural design, in the subjects of program elements, natural lighting, layout of education and circulation spaces, acoustics and color scheme.

Keywords: design guidelines, special education, autism, school design

ÖZ

OTİZMLİ ÇOCUKLAR İÇİN ÖZEL EĞİTİM OKULLARI TASARIM İLKELERİ
ÖZEL İLGİ ÖZEL EĞİTİM OKULU'NUN
TASARIM VE DEĞERLENDİRMESİ

Öktem, Zeynep
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Otizm toplumda görülüş sıklığı giderek artan ve yalnız otizmi olan bireyi değil, ailesinin tüm üyelerini ve yakınlarının yaşantılarını da etkileyen yaygın gelişimsel bir bozukluktur. Otizmin bu gün bilinen bir tedavisi yoktur, tek ve en etkili yaklaşım biçimi eğitimdir. Otistik çocukların eğitiminde değişik yaklaşım biçimleri kullanılmaktadır. Çocuğun yaşı, belirtilerin ciddiyeti ve ağırlığı ve çocuğun zihinsel yeteneği seçilecek eğitim yaklaşımlarını belirlemektedir. Bu çalışmada diğer eğitim olanakları arasından özel eğitim okullarının mimari tasarımı üzerine odaklanılmıştır. Çalışmanın amacı, otizm tanısı konulmuş ve özel eğitim desteği alması gerekli görülen çocuklar için özel okul düzenlemenin mimari ana hatlarını belirlemektir. Bu mimari ilkelerin gelecekte benzer programlarla çalışacak mimarlara yol gösterici olacağı umulmaktadır. Bu çalışma aynı zamanda bu tezin yazarı ve Mimar Kadri Atabaş tarafından gerçekleştirilen Özel İlgi Özel Eğitim Okulu tasarımının bir değerlendirmesini içermektedir. Bu çalışma sırasında edinilen bilgiler ışığında önceki tasarım yeniden değerlendirilmiş ve mimari tasarım yönünden, program öğeleri, doğal ışıklandırma, eğitim ve dolaşım mekanlarının düzeni, akustik yalıtım ve renk şemaları konularında gerekli önerilerde bulunulmuştur.

Anahtar kelimeler: özel eğitim, otizm, tasarım ilkeleri, okul tasarımı

To Special Children

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Finally, I would like to express my gratitude to three people who made this thesis possible; my mother Ferhunde Öktem with her endless support, patience and her wise guidance; my dear friend Gizem Kolbaşı who always encouraged me to write, provided me mental support and helped me drastically throughout the thesis process, and finally my best friend Onat Öktem who was always there for me, helped me, supported me, opened up new horizons for me and made me smile even on the hardest days.

I would also like to add that in order to compansate the damage caused on nature during the preparation of this thesis, a pine tree has been planted by the author.

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INTRODUCTION

1.1 Problem Definition

> When I call him he behaves as if he does not hear me. He keeps on shaking, on the side of his eyes, the object that he took in his hand for hours. We bought a car for him to play. He reverses it and just turns its wheels. He has great interest in commercials. As soon as he hears the voice of it, he rushes into the living room. He does not watch any program on television other than that. We cannot move anything of its place in the house. He wants us to follow the way that he is used to when we go somewhere. We cannot play games together. He has strange hand moves. He sometimes moves as if he winnows. He sometimes walks on his finger-tip. From time to time he has temper tantrums which is impossible to calm down and we do not understand why it happens. These times are a real disaster.
> A Mother – İlgi Protection of Autistic Children Foundation

These words are the common cry outs of the parents who have children with autism. Autism is a complex developmental disability which affects mostly a person's ability to communicate and interact with others. It typically appears during the first three years of life and affects individuals differently and to varying degrees. Autism is a lifelong condition which requires intensive education for treatment. It is defined by a certain set of behaviors and is a "spectrum disorder" which can cause additional difficulties in terms of sensory perception, mental retardation and difficult behaviors.

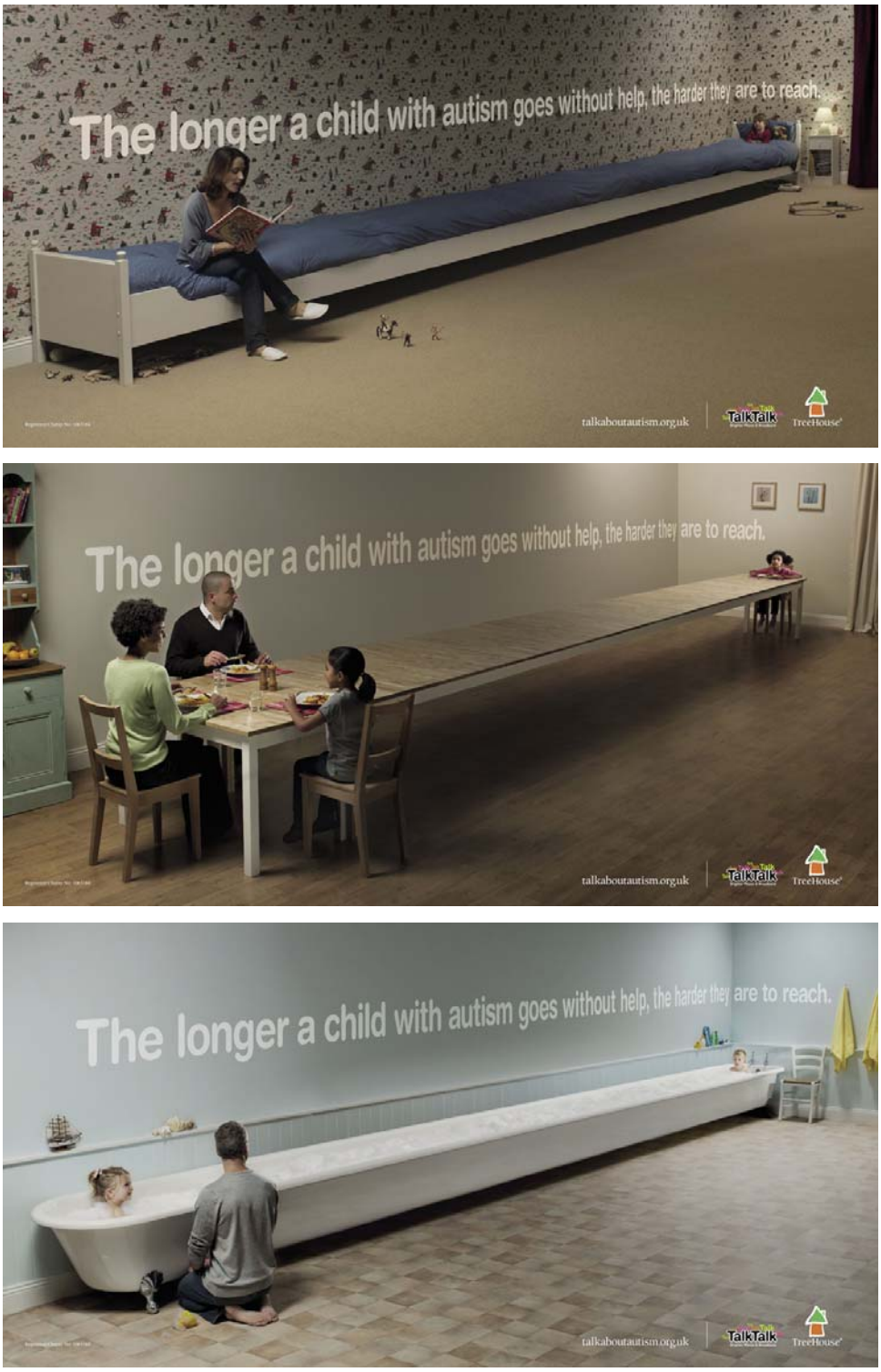

Figure 1.1: poster designs by CHI & Partners, London, UK; Creative Director: Ewan Paterson; Art Directors: Alan Cinnamond, Sandy Cinnamond; Photographer: Tim McPherson; Typographer/Designer: Craig Ward; Published: August 2009 (www.ibelieveinadv.com/2009/08/page/2)

Education is said to be the only way to treat individuals with autism. Furthermore the sooner a child starts his/her education, the better are his/her chances to cope with autism. A very striking poster study about autism awareness helps to visualize the isolation and difficulties in the world of an autistic child caused by the inability to communicate and comprehend. These expository posters designed by CHI & Partners, also highlights the importance of education for a child in the autistic spectrum with the headline that reads: "The longer a child with autism goes without help, the harder they are to reach" (**Figure 1.1**).

The rate of autism is expressed as 1/1000 in the population; however, this syndrome deeply affects more people than this given number. Assuming an average family is composed of four individuals, the extent of this problem becomes worth attention because having an autistic individual in the family would dreadfully shape the other members' lives and interactions. Considering the difficult therapy, education and caring needs of these individuals, this issue becomes more and more complicated. In developed countries the necessary number of nursing institutions make it easier for children and their parents to cope with this situation. In Turkey however, compared with the developed countries, there are few or no education institutions for children with autism, which are designed according to their needs. Most of the existing schools and centers for children with autism are conventional apartment buildings later converted to a school building with limited resources.

According to the statistical data supplied by Prime Ministry Republic of Turkey, Turkish Statistical Institute, in 2008 the population of Ankara is given 4.395.888 (tuik.gov.tr). When calculated, the number of individuals in the autistic spectrum from the ratio 1/1000 the number is approximately 4400. Yet according to the statistical research conducted by Republic of

Turkey Ministry of National Education, General Directorate of Special Education Guidance and Counseling Services the number of autistic children who receives special education in mainstream schools, education centers and special education classes for autistic children, in 2006-2007 academic years is 2114 nationwide (orgm.meb.gov.tr). This number does not include children who receive a three hours education per week with the help of the government. Still receiving this much education has inconsiderable effects on the child's development and the number of children who receive a proper education is very few compared to those in need.

One hopeful news on this regrettable situation is Minister Nimet Çubukçu's letter to governorships which shows the new awareness of the ministry on the subject. On the letter dated June 2009, Çubukçu asks for governorships' contribution in terms of opening new education centers for autistic children. She confirms that the 27 education centers and 5 job training centers for individuals with autism, opened by the Ministry of National Education are not sufficient for autistic individuals nationwide and that this number has to be raised in order to meet these children's educational needs. By highlighting the importance of education for autistic individuals Çubukçu requests the unused public buildings and schools to be converted into an education center for individuals with autism (Çubukçu, orgm.meb.gov.tr). This might be a good start considering the urgent need for centers to educate autistic children and preparing them for life.

To provide a decent place for the education of these children, further measures have to be taken in terms of architectural conditions, from program elements down to detailing, which greatly affects children's state of mind, making them more peaceful and open to new learning. Therefore the starting idea of this thesis was to discover design guidelines for a

school of children with autism, which is hoped to result in a good quality, inclusive space that would provide a stress-free, safe environment to enhance the learning process of children. These guidelines would facilitate the work of the teachers as well, while guiding their pupils in the autistic spectrum to be more independent, and also would support the parents with a little relief and confidence that their children are having the proper education which they deserve in a considered environment.

1.2 Background and Reasons for Concern

Author's acquaintance with the subject derives from her mother's work as a psychologist. From childhood, many examples of autistic patients and problems that the families had to face were told frequently by Prof. Dr. Ferhunde Öktem. In the past years, the author also voluntarily took part in various academic researches involving autistic children. However, the main interest toward the relationship with architecture and autism started in 2007, when the director and founder of İlgi Protection of Autistic Children Foundation, Nejla Arslankurt requested from the author to design a school building for children in the autistic spectrum, on a site donated by Ankara Governorship. The preliminary designs were made by the author in cooperation with architect Kadri Atabaş, who also agreed to provide his architectural services free of charge. Application drawings were prepared later by Atabaş's architectural office. Unfortunately the school could not be built until this day because of financial problems of the foundation.

1.3 Aims and Objectives of Study

The thesis aims to draw architectural guidelines for the design of a special school for children with autism which is hoped to aid architects who will work with similar architectural programs in the future. The research conducted for the thesis shows how architecture can enhance the daily experience of autistic children and their teachers by decreasing the stress factor thus allowing them to be more open to education and interaction. An evaluation of the initial design (titled in the thesis as “preliminary design”) made by the author and Kadri Atabaş will be presented in the light of newly gathered information, since the data about how the architecture of such a school should be were limited to the discussions made with school administration at that time. Following the thesis research, the initial design is reviewed for improvements, resulting with a revised project (titled as “revised design” in the thesis).

1.4 Scope and Method of Study

1.4.1 Literature and Material in the Field of Psychology

For the thesis, first the common characteristics of children in the autistic spectrum and their sensory sensibilities have been researched. Along with published materials written by specialists about the subject, the books written by autistic individuals have provided an insight about autism. Temple Grandin’s book “Thinking in Pictures – My Life with Autism” was one of these resources which provided first hand information about the chaotic life of a person who has Asperger’s Syndrome. Her following words help “normal” people to understand how it feels in the world of an autistic individual:

> The world of the nonverbal person with autism is chaotic and confusing. A low-functioning adult who is still not toilet-trained may be living in a completely disordered sensory world. It is likely that he has no idea of his body boundaries and that sights, sounds, and touches are all mixed together. It must be like seeing the world through a kaleidoscope and trying to listen to a radio station that is jammed with static at the same time. Add to that a broken volume control, which causes the volume to jump erratically from a loud boom to inaudible. Such a person's problems are further compounded by a nervous system that is often in a great state of fear and panic [...]. Imagine a state of hyper arousal where you were being pursued by a dangerous attacker in a world of total chaos. Not surprisingly, new environments make low-functioning autistics fearful (Grandin, 48).

These words make one realize how different and hard the perception of the environment for an autistic individual. Some other resources gathered from autistic people proved that these inconveniences may vary from person to person. Besides the published materials, videos about children with autism, journals and letters written by families and by some high-functioning autistic children could be accessed with permission which provided a greater understanding on the difficulties of life with autism. The diagnostic criteria for individuals with autism is defined and widely used from the Diagnostic and Statistical Manual of Mental Disorders published by The American Psychiatric Association (DSM-IV-TR, 2000). Besides these diagnostic criteria, the books written by specialists in the subject explained in detail the different characteristics of autism like difficulties in communication and interaction, additional sensory impairments, intellectual functioning, difficult social behavior and these children's special skills. The books and papers from Leo Kanner and Hans Asperger who first identified the disorder and named it "autism", other specialists on the subject; Lorna Wing, Uta Frith, Michael Rutter, Melda Akçakın, Laura Scheribman, O. Ivar Lovaas, Sunti Chakrabati and Eric Fombonne were the most helpful to understand different characteristics of autism which may affect the architectural design of their environment. Adding to this, the treatment and education options for children with autism have been researched.

1.4.2 Case Studies from Architectural Literature

For the architecture of a special school for children in the autistic spectrum, relatively less information is present, since this is rather a new subject. First, the examples of schools built for autistic pupils were researched. It was interesting to find out that most of the designers who work for autistic people were individuals who had an autistic relative in the family, be it a son or a brother. Apart from these, other special schools from Europe and USA, which include autistic pupils besides those who have other disabilities were inquired. These case studies provided specific examples for the design of a special school for autism.

1.4.3 Building Regulations

For a general understanding, the regulations for special schools supplied information in a broader sense. In Turkey the regulations for special schools and the centers for autistic children are organized by the Republic of Turkey Ministry of National Education. These regulations, however, provide seemingly less information about the necessary design guidelines for the architecture of such a school or center. The regulations for special schools in United Kingdom are said to be more elaborate and successful in terms of supplying the necessary information for the architects commissioned to design a special school. “The Building Bulletin 77 - Designing for Pupils with Special Educational Needs and Disabilities in Schools” (revised and updated 2005) published by UK Department for Education and Employment provides a detailed information for the elements to pay attention in the design of special schools in a wide range from site selection to the type of furniture or plumbing. The document also

provides technical and practical advices along with guidance and briefing about special schools in which a special section is reserved for pupils with autism.

1.4.4 Interviews

Additionally, maybe the most insightful information was collected from the personal interviews implemented with open ended questions, with different actors in diagnosing and educating children in the autistic spectrum. Interviews were made with;

(A) Psychologists who have worked with children with autism for many years, Prof. Dr. Ferhunde Öktem, Prof. Dr. Bülbin Sucuoğlu and Prof. Dr. Füsun Akkök who provided valuable information about the nature of autism, examples of autistic patients and some design hints from the abroad special schools abroad which they have visited,

(B) Associate Professor Arzu Gönenç Sorguç in METU Faculty of Architecture, who is specialized in acoustics,

(C) Nejla Arslankurt, the director and founder of İlgi Protection of Autistic Children Foundation who explained with patience the program elements they requested in the design of the new school and the important features the school should possess for a better planning,

(D) The director of Private İlgi Special Education School Gülay Karasu, and teachers Çetin Şahin and Ümran Mercan who helped

drastically by telling about the problems they encounter in their current school in terms of safety, flexibility, obsessions of children, and sensory sensibilities, pointed out the problems faced by children, families or teachers in the environment, and contributed with valuable suggestions about the design of a school.

The common idea which derived from most of these interviews was the necessity for a separate school for children with autism specially designed with their peculiarities and needs in mind, as well as thinking about the well-being of children, their families and teachers. This involves general precautions to be taken like those required in mainstream schools. Furthermore there are additional principles to investigate when designing for children in the autistic spectrum since situations which normally would not affect other children can cause great discomfort or fear with autistic children. Similarly specifically designed environments can help to reduce stress and difficulties, thus helping children during their journey to become more independent individuals.

1.5 Thesis Structure

In the thesis, first the definition and general characteristics of autism, which is defined as “a pervasive developmental disorder” (DSM-IV-TR, 2000) will be elaborated along with demographical prevalence. Following this chapter, in Chapter 3 the advantages and disadvantages of different treatment and education opportunities will be discussed. A brief information will be given about the education programs which mainly originated from USA and now used around the world for the treatment of autism.

The fourth chapter examines the design guidelines for a school for autistic children. These “dos and don’ts” are told beginning from a general environmental character, and continuing with design issues which are important for these schools, such as planning of the school and program elements, acoustics, lighting, color scheme and rhythm in the school. The detailing of the school in coating and paving and the type of furniture and fixtures that have to be used in special education schools for autistic children are introduced following these design guidelines, in this chapter. Some of the various program elements which can be introduced to a school for children with autism, were acquired from the program requirements given by the administration of İlgi Protection of Autistic Children Foundation. Additional program components were derived from examples of special schools abroad and national regulations on the subject. The ancillary design elements like materials for paving and coating, fixtures and furnishings may seem as details yet has a great effect on the well-being of the pupils and their teachers. In the light of this information, a checklist for design of special education schools which sums up the requirements specific for such education environments and necessary guidelines which apply for all schools but at the same time which are very crucial for special education schools for autistic children will be provided.

Chapter 5 will focus on the design for Private İlgi Special Education School realized by the author of this thesis and architect Kadri Atabaş. The second part of this chapter tries to evaluate the preliminary design in the light of newly gathered information about how the design of a special school for autistic children should be and suggests some changes in the design in terms of planning, program elements, layout of classrooms, façade, lighting, acoustics and color and material scheme, in the given site.

CHAPTER 2

DEFINITION AND GENERAL CHARACTERISTICS OF AUTISM

This chapter provides a basic information about the characteristics of autism. It is important to remember that not all attributions of autism is applied to every child with autism. Each child has unique problems and skills. Each has different mental capacities and different impairments in terms of communication and language skills, sensory perception and social behavior. The following headlines are the most common specialties seen in autistic individuals.

2.1 Definition and Demographic Characteristics of Autism

2.1.1 Definition

Autism is defined primarily by the lack of social interaction and communication and restricted repetitive and stereotyped patterns of behavior, interests and activities (DSM-IV-TR, 2000). Some behavioral abnormalities accompany these underlying impairments (Wing, 1976:23). Autism is a complex developmental disability that typically appears during the first three years of age and continues throughout life. The studies conducted about autism and the discoveries about the nature of this developmental disorder have been condensed in the recent years. In the beginning of the 19th century, there has been very few publications about

cases which demonstrate severe psychological problems about the deterioration in the developmental course of children. The first clinical concepts were drawn from adult psychiatry. As a result these kinds of disturbances were classified as psychosis. In 1943 Leo Kanner and in 1944 Hans Asperger, independent from each other, used the same term “autism”, in order to identify and classify the disorder (Asperger, 1944; Kanner, 1943). In 1943 Kanner reported a syndrome which he called “infantile autism” and defined this syndrome by setting diagnosis criteria proper for children. Following Kanner’s landmark paper, others described these children with similar characteristics. (Rutter, 1985; Rutter and Schopler, 1987).

The systems used for the classification of mental disorders DSM (Diagnostic and Statistical Manual of Mental Disorders) and ICD (International Classification of Disorders) can be applied for adults as well as for children. In 1980, for the first time, autism was defined under the title “Pervasive Developmental Disorder” (PDD) in the classification made by American Psychiatric Association. In the term Pervasive Developmental Disorder, the term “pervasive” stands for problems that are variant and extensive in autism, and the term “developmental” stands for delays in the development of multiple basic functions including socialization and communication. These disorders, beginning from the early ages, affect every stage of one’s development (Willemsen-Swinkels and Buitelaar, 2002).

In the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, Text Revision (DSM- IV-TR, 2000) autism is one of the five disorders that fall under the broad category of Pervasive Developmental Disorders (PDD). The other disorders include Asperger Disorder, Pervasive Developmental Disorder Not Otherwise Specified (PDD-NOS),

Childhood Disintegrative Disorder and Rett Disorder. The term Pervasive Developmental Disorder is used synonymously with Autism Spectrum Disorder. According to the recent prevalence studies, autism is regarded as the most common disorder among the pervasive developmental disorders (Bryson and Smith,1998).

The American Psychiatric Association defines Autistic Disorder as follows (DSM-IV-TR, 2000):

(I) A total of six (or more) items from (A), (B), and (C), with at least two from (A), and one each from (B) and (C)

(A) qualitative impairment in social interaction, as manifested by at least two of the following:

1. marked impairments in the use of multiple nonverbal behaviors such as eye-to-eye gaze, facial expression, body posture, and gestures to regulate social interaction
2. failure to develop peer relationships appropriate to developmental level
3. a lack of spontaneous seeking to share enjoyment, interests, or achievements with other people, (e.g., by a lack of showing, bringing, or pointing out objects of interest to other people)
4. lack of social or emotional reciprocity (note: in the description, it gives the following as examples: not actively participating in simple social play or games, preferring solitary activities, or involving others in activities only as tools or "mechanical" aids)

(B) qualitative impairments in communication as manifested by at least one of the following:

1. delay in, or total lack of, the development of spoken language (not accompanied by an attempt to compensate through alternative modes of communication such as gesture or mime)
2. in individuals with adequate speech, marked impairment in the ability to initiate or sustain a conversation with others
3. stereotyped and repetitive use of language or idiosyncratic language
4. lack of varied, spontaneous make-believe play or social imitative play appropriate to developmental level

(C) restricted repetitive and stereotyped patterns of behavior, interests and activities, as manifested by at least two of the following:

1. encompassing preoccupation with one or more stereotyped and restricted patterns of interest that is abnormal either in intensity or focus
2. apparently inflexible adherence to specific, nonfunctional routines or rituals
3. stereotyped and repetitive motor mannerisms (e.g hand or finger flapping or twisting, or complex whole-body movements)
4. persistent preoccupation with parts of objects

(II) Delays or abnormal functioning in at least one of the following areas, with onset prior to age 3 years:
(A) social interaction
(B) language as used in social communication
(C) symbolic or imaginative play

(III) The disturbance is not better accounted for by Rett's Disorder or Childhood Disintegrative Disorder

Since autism is a disorder that affects entire mental development, different symptoms emerge at different ages which should be evaluated accordingly (Frith, 2003).

2.1.2 Prevalence

Epidemiologic studies about autism have been conducted from the mid 1960's (Volkmar et al. 2004). In recent years, it has been reported that the frequency of autism is gradually increasing. While in 1970's the prevalence of autism was reported to be 2 to 5 per 10.000 in epidemiologic studies, after some years this number was ascended to 6 to 9 per 10.000 according to a study conducted by Fombonne (Fombonne, 1999). A more recent study shows this ratio to be 16,8 per 10.000 (Chakrabarti and Fombonne, 2001). One reason may be that in recent years diagnostic criteria for autism have been improved and the awareness for the disorder has increased (Volkmar et al. 2004; Stubbs and Cheng, 2005). In Turkey, according to the surveillance study for chronic disorders in children, 39 children out of 40.939 that have been surveyed were diagnosed to have autistic disorder (Ro-Codec, 1997). This number approximately equals to a ratio of 1/1000. Studies and prevalence reports show that the frequency of autism is increasing systematically and this situation should be an urgent public health and education concern (Centers for Disease Control and Prevention in United States, 1998).

2.1.3 Demographic Issues

Kanner in his first publication about the disorder in 1943 reported that the parents of children who have infantile autism were well educated and they were people who were successful in their jobs. Later studies also stood by this idea. However recent researches show no correlation between the social status of parents and the disorder (Fombonne, 2003). Autism is distributed throughout the world among all races, nationalities, and social classes.

2.1.4 Sex Ratio

In epidemiological studies conducted in 1981 about the sex ratio of autistic children, an overall male:female ratio of 2,6:1 was reported (Wing, 1981). In Turkey male/female ratio is said to be 1,7:1 (Ro-Codec, 1997). In some other foreign and local studies researchers claim that four in every five people with autism are male. (Akçakın et al. 1993; Rutter and Lockyer, 1967; Tsai and Beisler, 1983; Volkmar and Szatmari, 1993). These results show the need for further investigation on the sex ratio in autism.

2.1.5 Causes of Autism

There is no known single cause or cure for autism. The causes of this developmental disorder which is a lifelong condition, causing neurological abnormality are still full of mystery. Even though differences have been found in the brain scans of autistic individuals (Stubbs and Gene, 2005:233) the reasons of these abnormalities, whether genetic or

environmental, are still unknown. Researchers are investigating a number of theories, including “genetics, susceptibility from birth, problems during pregnancy, as well as environmental factors, such as viral infections, metabolic imbalances, and exposure to environmental toxins such as heavy metals or mercury which are more prevalent in our current environment than in the past” (Autism Society of America).

2.2 General Characteristics of Autism

The severity of autism is not uniform in all children (Wolff and Chess, 1964). Some children may exhibit severe behavior problems in the form of highly unusual, aggressive, and in some cases, self-injurious behavior while others with a milder autism resemble to a child with learning disabilities (teacch.com). Nevertheless, however severe the disability is, children with autism are usually handicapped in the areas of communication and socialization. Some of these behavior problems are more persistent than others especially with children who have more severe autism. Consequently these behaviors are difficult to change and require intense therapy. Apart from the pattern of affected and unaffected functions which is personal for each child, the impact of the environment has an important role on the severity of these disabilities. Rutter mentions that “even normal children brought up in some environments will be disturbed in behavior or educationally backward” (Rutter, 1972). Similarly Lorna Wing states that these children are more vulnerable to the effects of their “social milieu” and need very skilled management to avoid “social withdrawal, disturbance in behavior and educational backwardness”, by adjusting the suitability of the environment” (Wing, 1976).

Children with autism may have extreme difficulties in socialization and communication areas. Understanding speech and language is another problematic area for these children. They seem unable to interpret correctly the feelings of other people and as a result, may respond inappropriately (Lewis, 1990). Most of them have sensory impairments on a large range. They may exhibit abnormalities in response to the physical environment. Most of the children in the autistic spectrum have concomitant mental disabilities. In addition, people with autism often exhibit extreme hyperactivity or unusual passivity in relating to parents, family members, and other people (teacch.com). The following areas are among those that may be affected by autism:

2.2.1 Communication

A hallmark feature of autistic children is their extreme deficits in speech and language (Omitz and Ritvo, 1976; Schreihman, 1988; Wing, 1978). About half of all autistic children never acquire any useful speech and are nonverbal. These children emit only a few sounds, although there is no known physical basis for this limited vocal output (Rimland, 1964). A substantial minority remain mute all their lives. Most children do not seem to intent to communicate meaningfully with other people.

According to Lorna Wing (1976), “the cognitive problems which affect the comprehension and use of language in whatever form it is presented (spoken, written, gestured, etc.) are of major importance in the syndrome of early childhood autism and may eventually be proved to be the primary impairments which explain the whole behavior pattern”.

These children eventually learn some appropriate speech, but only after intensive therapy. Those autistic children who do acquire speech before training, usually exhibit speech that is noncommunicative. Often the speech takes the form of echolalia, where the children merely repeat what they have heard without much indication that they comprehend what has been said (Chariop and Siiliman, 1987; Schreibman and Carr, 1978).

Another speech anomaly, probably related to echolalia, is pronominal reversal (Kanner, 1943; Rutter, 1978). For example, the child may say, "You went to cookie house " while meaning “I went to cookie house." It is quite common for autistic children to avoid pronouns altogether and to refer directly to themselves and others by name ("Burak want cookie").

The intonation of autistic children is often unusual, and their quality of speech, has been described as “mechanical sounding, poor control of vocal pitch, volume and intonation, and articulation” (Baltaxe, 1981). Their comprehension is usually quite limited. Also, speech may be used in a self-stimulatory manner (Lovaas et al. 1977) and may serve the function of sensory input as opposed to communication. Also, those children who do learn to speak, seldom learn conversational skills (Chariop and Miisfein, 1987; Rimland, 1964). Their sentences have immaturity of grammatical structure. Finally, even the most skilled autistic speakers have great difficulty with abstractions, metaphors, and subtle associations (Schreibman and Chariot, 1987).

Unlike deaf children and those with developmental receptive speech disorders, autistic children do not use gesture to compensate for their speech problems (Wing, 1976). Very few autistic children point or use their direction of gaze to indicate what they want. They rarely nod or shake their heads to show agreement or disagreement.

2.2.2 Sensory Impairment: Abnormal responses to sensory experiences

The parents of autistic children often describe their child as "living in a world of his own" or as "not tuned into reality" (Koegel and Schreibman, 1976). Typically, autistic children appear to have a sensory deficit and are generally unresponsive to their environment. This apparent sensory deficit generally causes the parents of autistic children to suspect that their child is either deaf or blind (Schreibman and Charlop,1989). Autistic children appear to have difficulty in making use of incoming information from their senses. The reactions to their sensory experience seem often bizarre.

Many children with autistic spectrum disorders have unusual reactions to certain sensory stimuli. These reactions vary along a “hyper to hypo-responsivity continuum” (Lewis, 1990:132). An autistic child may show no response to a loud noise while s/he will turn to the rustle of a piece of paper. Although their vision and hearing are intact, they refuse to respond to specific noises or looking to a face. For each function that is hyper or hypo sensitive it is necessary to identify it and make a specific plan to change it.

2.2.2.1 Visual Problems

One of the most prominent signs of autism is the abnormalities of visual inspection. The visual sensory input may cause different reactions in different children. Children with autism are generally attracted to spinning objects, and “a child may rock, grimace, and flap his arms in excitement

while watching a spinning top" (Wing, 1976). Fascination with lights, shiny objects or special patterns may be seen in autistic children as well as babies. Bright lights and colors might result in stress for some children while others may enjoy these visual stimuli.

Before the age of 5, some autistic children appear to use peripheral rather than central vision. Thus a child may ride a tricycle without apparently looking where he is going, look past people rather than at them, but sometimes giving them rapid flashing glances, recognize moving objects more readily than things that are stationary and may even watch television out of the corner of his eye (Wing, 1976).

Another common characteristic of these children is that they avoid looking at certain visual stimuli, especially human faces. "They may look down under lowered eyelids, turn their heads away or even close or cover their eyes" (Wing, 1976). Added to that Bryna Siegel (1996) mentions that they may closely inspect certain objects and pay attention to details rather than the overall picture (71).

2.2.2.2 Auditory Problems

There is also some evidence which shows that the senses of an autistic child are not as distinct as those of a normal child. Oversensitivity to some noises is often seen, causing the child to cover his ears to avoid the situation and become distressed. On the other hand, these children may be fascinated by certain sounds (Wing, 1976). Temple Grandin, a high-functioning autistic individual mentions in her book about her life with autism, that loud noises were a great problem in her childhood and they actually caused pain, "like a dentist's drill hitting a nerve". Similarly she

complains about minor noises that can be tuned out by most people, drove her to distraction (Grandin, 2006:63). High-pitched and shrill voices like that of a hair-dryer, electrical drills, blenders, and vacuum cleaners are intolerable for most children with autism.

2.2.2.3 Tactile Problems

This abnormal responsiveness is associated with the tactile sensory modality as well (Ritvo and Freeman, 1978). A child may be oversensitive to a tickle and undersensitive to pain. As a result necessary operations such as washing, dressing and hair brushing may provoke screams of fury. In marked contrast, the same children often react with intense pleasure to rough games of tickling, swinging round and bouncing up and down, giving the appearance of complete normality while the game lasts (Wing, 1976). Children may want to scratch and touch on different kinds of surfaces to feel the texture resulting from the fascination with tactile sensations. Smooth surfaces such as plastic, wood or fur are attractive to some autistic children and may lead to problems if a child caresses the fur coats of strangers in the street. Lorna Wing (1976) tells the social embarrassment of a mother whose autistic boy loved to touch women's stockings.

Research results support the hypothesis that the hyper and hypo-responsivity to touch, which is sometimes observed in autistic spectrum disorders, is not a perceptual sensory problem, but may probably be emotional in origin (Güçlü et al. 2007).

2.2.2.4 Taste and smell

The same patterns may be seen with taste and smell. These sensitivities can lead to autistic children being very particular about what they eat, how it is cooked, and how it is presented. At the extreme end, some children have very narrow food preferences, because their taste receptors may be hypersensitive, therefore they will reject certain tastes and textures of food, and end up restricting their diets to only for example white rice, or fries, while others may not have a taste sensation, therefore they tend to eat anything such as rocks, dirt, etc.

Hypersensitivity to smell can also cause eating problems, as well as behavior problems in public if the smells are overwhelming or make the child feel ill.

A balanced approach towards healthy eating in autism can be acquired with special dietitians since these children can be extremely prescriptive in terms of eating habits. The taste and texture of food, even its color, shape and brand packaging is important for children with autism (Cornish, 1998). For some people, foods with strong odors and tastes can overpower an overly sensitive nervous system. Many autistic children hate crunchy foods because they sound too loud when chewed (Grandin, 2006:71).

2.2.2.5 Paradoxical Responses

"Paradoxical" responses to sensations are also observed occasionally. “Thus a child may cover his eyes in response to a sound that distresses him or his ears in response to a visual stimulus as if he had difficulty in sorting out the different kinds of experiences” (Wing, 1976).

Some autistic people report that they find difficulty hearing and seeing at the same time as their sensory channels get mixed up. When concentrated on listening somebody they might not notice visually what happens around them. Temple Grandin cites the sensory experience of an autistic adult by saying that for him, sound came through as color, while touching his face produced a soundlike sensation (Grandin, 2006:72).

2.2.2.6 Overselectivity

These sensory deficits may result in overselectivity for autistic children. They may perceive and respond to only a limited portion of sensory cues around them. Schreibman and Charlop (1989) point out the difficulties experienced when teaching a child with autism by saying that “autistic children typically fail to respond to all cues presented in the learning situation and tend to respond to only one cue or component in the relevant stimulus environment”. This response to only a limited portion of the available cues has been termed stimulus overselectivity which greatly interferes with an autistic child's progress. One example can be given in terms of academic education in which the teacher is teaching the alphabet. In order to determine the difference between “b” and “p”, one must respond to the total stimulus of these letters which is the circle part and the line part. However, an autistic child may "overselect" the circle part of the letters and may not respond to the lines. Thus, to this child, there would be no difference between “b” and “p” (Schreibman and Charlop, 1989).

2.2.3 Intellectual Functioning

Initially, it was thought that autistic children were intelligent (Kanner, 1943) and that their poor performance in a variety of areas was secondary to their social deficits. However, normal or above-normal intelligence is not associated with autism today. In fact, 60% of autistic children have IQs below 50, 20% measure between 50 and 70, and only 20% have IQs above 70 (Ritvo and Freeman, 1978). The assessment of the intellectual functioning of autistic children is quite difficult because of behaviors that interfere with test taking (Ritvo and Freeman, 1978).

The same properties of IQ that are seen in normal children apply to autistic children as well (Rutter, 1978). Majority of autistic children are intellectually retarded. However poor performance on IQ tests might also be a consequence of autistic children knowing the answers but deliberately avoid giving them (Clark and Rutter, 1977).

Autistic children's IQ tends to remain stable during middle childhood and adolescence (Gittleman and Birch, 1967; Lockyer and Rutter, 1969) and tends to be predictive of educational performance (Rutter and Bartak, 1973). Thus, it must be concluded that autistic children are frequently functionally retarded.

2.2.3.1 Mental retardation

Mental retardation is a separate entity from autism. Individuals with autism can have different levels of IQ. Some may be what they call a savant autistic like the character played by Dustin Hoffman in the movie “Rain Man” (1988) and others may have a low IQ which makes it even more

difficult to overcome the problems autism causes. The situation in mentally retarded autistic children is more difficult and includes both characteristics of these two disabilities. Thus various characteristics of mental retardation will be briefly explained here.

According to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (2000), Mental retardation is characterized by “significantly subaverage intellectual functioning: an IQ of approximately 70 or below on an individually administered IQ test, with onset before age 18 years and concurrent deficits or impairments in adaptive functioning (i.e., the person's effectiveness in meeting the standards expected for his or her age by his or her cultural group) in at least two of the following areas: communication, self-care, home living, social/interpersonal skills, use of community resources, self-direction, functional academic skills, work, leisure, health, and safety.” (American Psychiatric Association, 1994:37)

Subcategories of mental retardation differentiated by IQ scores include (DSM-IV, 2000:40)

- Mild Mental Retardation: IQ Level 50-55 to approximately 70
- Moderate Mental Retardation: IQ Level 35-40 to 50-55
- Severe Mental Retardation: IQ Level 20-25 to 35-40
- Profound Mental Retardation: IQ Level Below 20 or 25
- Mental Retardation, Severity Unspecified: when there is strong presumption of Mental Retardation but the person's intelligence is untestable by standard tests.

- **Profound Mental Retardation**

During their preschool age, these children are totally dependent to someone. Gross retardation and very less operation capacity in sensory-motor domain is observed. Generally these children should be taken care in hospitals or other institutions. In school age, minor motor development can be observed. Needs are expressed with limited vocabulary. They might respond to eating and toilet training though it is very minimum. In their adulthood they might develop some ability in motor and language skills. They might maintain their toilet and eating habits, however they require constant institutional care (Öktem, 1981:327; Akçakın, 1988:397-398; Özel Eğitim Hizmetleri Yönetmeliği, 2005).

- **Severe Mental Retardation**

These children during their preschool age, until the age of 5, have limited motor development. Verbal communication is very less and inadequate. They cannot meet their own needs and require constant care and attention. With education in the school age they can learn to talk and communicate. They can be educated for basic health habits. They can benefit from systematic habitual training. As an adult they can manage themselves with constant guidance. In limited levels, they can acquire adequate ability for self protection in controlled environments (Öktem, 1981:327; Akçakın, 1988:397-398; Özel Eğitim Hizmetleri Yönetmeliği, 2005).

- **Moderate Mental Retardation**

Their motor development is low. They can talk or learn to communicate in preschool age. Very little social interaction can be observed. They can manage their lives with moderate guidance. They can benefit from social

and working ability training. They can be educated until the level of a second year primary school class. They can learn to stroll in an habitual place. As an adult they can manage themselves in works that require limited ability under controlled and protected circumstances. They might require guidance in social or economic stress situations (Öktem, 1981:327; Akçakın, 1988:397-398; Özel Eğitim Hizmetleri Yönetmeliği; 2005).

- **Mild Mental Retardation**

In preschool age they have minimum deficiency in sensory and motor fields. They can develop social skills and communication abilities. In adolescent age, they can reach to an education level of 5th year primary school class. They might require guidance in the field of social adaptation. These children are educated in mainstream primary schools . After school, in their adult age they can acquire social and work related skills with some little support. They need guidance and help in extraordinary social and economic crizes (Öktem, 1981:327; Akçakın, 1988:397-398; Özel Eğitim Hizmetleri Yönetmeliği, 2005).

Additionally many autistic children start having epileptic fits when they reach adolescence. This is much more common among autistic children with low IQ than those who are of normal intelligence (Clark and Rutter, 1979).

2.2.3.2 Special skills

Many people with an autism spectrum disorder have been found to possess exceptional skills in math, music, memory, or art, despite all their problems (Applebaum et al. 1979; Rimland, 1978). According to Lorna

Wing (1976) non-language-dependent skills, may be seen even in mute children; and the skills that rely upon exact memory, are easiest to demonstrate in children who can talk.

However mostly this memory is rote and very limited to the specific subject or skill. In most autistic children, while the special skills stand out in contrast to the low level of other attainments, the performance expected of a normal child of the same age is not reached. An autistic child might multiply six digit numbers but fail to answer a simple question like “if every dog has four legs, how many legs do five dogs have?” (Personal interview with Öktem. 25.09.2009).

Autistic children often spend long periods of time arranging objects in a precise way and notice the slightest change in how familiar things are arranged. Majority of these children have exceptional good visual memory. Small numbers of autistic children has sensibility to the spatial arrangement and they have exceptional drawing abilities (Selfe, 1983). An autistic individual Stephen Wiltshire can draw a city panoramically after a few hours of visiting that city (**Figure 2.1**).

Figure 2.1: Panaromic city drawing by Stephen Wiltshire (www.aspieministry.wordpress.com/2009/10)

A few of the brighter children learn to play a musical instrument or even compose music. Taylan who was diagnosed autistic at the age of two, can play Bach in piano flawlessly at the age of 16 (Hürriyet Gazetesi, 23.05.1989).

“The classically autistic child appears to be able to store items in his memory for prolonged periods in the exact form in which they were first experienced” (Wing, 1976). These children can remember long lists of names, bus, train and underground routes, dialogs from commercials etc. Some may memorize mathematical tables and bus schedules or may demonstrate their ability to calendar-calculation by determining on what day of the week a certain day in the calendar will fall. However good memory is often a characteristic of autistic people, but attention differences can mean that the good memory is only apparent in limited settings. Interestingly, many of these islets of superior ability are seen in children who are not toilet-trained or who do not speak (Wing, 1976).

Despite these skillful autistics, most of the autistic child’s memory skills are extremely limited even though they may give the initial impression of being rather good. It is possible that s/he remember things exactly as they happen because s/he had difficulties making sense of situation and abstracting from them (Lewis,1990).

2.2.3.3 Lack of imagination

“One of the major problems with autistic children is their lack of imaginative play. They do not play pretend games, either by themselves or with other children” (Wing, 1976).

“The paucity of pretend play in children with ASD is such a robust finding that it now forms part of a clinical tool for the early detection of autism” (Baron-Cohen et al. 1996). Toys are not used as material for imaginative games. Instead, the children tend to handle, taste, smell and gaze at toys and other objects to obtain simple sensations. They prefer to turn the wheel of a toy car rather than playing with it. In the absence of normal imaginative pursuits, autistic children tend to occupy themselves in various repetitive, uncreative ways (Wing, 1976).

They have difficulties in imagining other people's thoughts and understanding that another person's belief about a situation might be different from one's own (Baron-Cohen, Leslie, and Frith 1985). A very striking example of this situation can be given by a false-belief task where a child is asked to answer some questions about a hypothetical situation. One example of these questions represents two friends, say Ayşe and Zeynep, who have a basket and a box. Ayşe has a candy which she places in the basket and leaves the room. Zeynep then takes the candy out of the basket and puts it in the box. The child is asked than, where Ayşe would look for her candy, when she returns to the room. A majority of children with autism answer that she would look in the box, where they know the candy is hidden, because they cannot imagine that Ayşe does not know that Zeynep changed the place of the candy when she was not in the room (Personal interview with Öktem, 25.09.2009).

2.2.4 Social Behavior

The failure to develop normal social relationships is a characteristic of autism that has been continually emphasized in the literature as one of the

most profound and pervasive deficits of the syndrome (Rimland, 1964; Rutter, 1978; Wing, 1978). Autistic children generally prefer to be alone. They do not bond with their parents or seek out affection from them. In fact, they may avoid people, may resist attempts at holding and cuddling, and may fail to make eye contact.

These children's social impairment is also seen in their failure to make friends or to play with peers. Autistic children tend to avoid interactions with other children and their siblings. It thus appears that autistic children generally relate to people as "objects" (Rimland, 1964).

Recently, there has been some research that reports success in teaching limited social behavior to autistic children. (Odom and Strain, 1986). However, problems remain in that only a limited number of social behaviors have been taught and that these gains usually do not generalize.

Autistic children may often exhibit socially immature and difficult behavior. Lorna Wing exemplifies some of these behavior like the following:

> Autistic children may have temper tantrums and long periods of screaming especially if frustrated in any way. They may grab things off the counters in shops, run into other people's houses in search of things to add to the collection of the moment, take off their clothes in the street and sit in inviting puddles regardless of the traffic. Children who can talk may make naive and embarrassing remarks loudly in public, such as "There's a lavatory room" on seeing a window with frosted glass (Wing, 1976).

It is also common for autistic children to display emotions that are contextually inappropriate. For example, they may laugh when being punished or when someone gets hurt, and they may cry when being praised. Some children have moods swings, with cheerfulness at one moment and then an extreme tantrum with no apparent reason (Rimiand, 1964).

Additionally, autistic children show inappropriate fear responses. Some children are extremely afraid of commonplace items or situations and become terrified when confronted with them (Wing, 1976). Examples of these irrational fears include vacuum cleaner, hair dryer, a sock, postmen etc.

CHAPTER 3

TREATMENT AND EDUCATION OF AUTISM

3.1 Cure and Treatment

While talking about cure and treatment, all of the scientists stress the importance of early diagnosis and intervention, with the right services and supports. Different kinds of intervention, therapy and structuring environments can help children with autism and their family. Research reports show that all people who have autism can improve significantly with proper intervention programs.

Since the children with autism can be quite difficult for parents and teachers to control, special education, parent training, and other clinical interventions may be necessary to accelerate the progress of the children's welfare.

The cure for the treatment of autism has not been improved yet. In addition to this, there is no single treatment that will be effective for all people on the spectrum. Treatment and education approaches may be applied at the same time to help autistic children and their family. In other words treatment must be multidisciplinary and multimodal (Stubs and Cheng, 2005). According to Autism Society and Autism Research Institute (autism.com) "Intervention may help to lessen disruptive behaviors, and education can teach self-help skills that allow for greater independence".

The treatment should be decided according to each child's specific characteristics which means each treatment would be unique. Therefore the unique strengths, weaknesses and needs should be taken into consideration.

Several researches have been conducted on the effect of autism on the person himself/herself and their parents. These studies have indicated that having a child with disability put the parents under the risk of experiencing heightened level of stress compared to others (Bradley et al.1991; Smith et al. 2001)

Psychosocial interventions are crucial for having progress in the conditions of children with autism and their families. Speech therapists, occupational therapists, psychotherapist are fundamental aspects of treatment. Social skill groups, support groups can be helpful as well in dealing with difficult behavior and conditions of the children with autism.

During the treatment of the children with autism, main actor is the parents since they function as co-therapists. In this sense, the parent-professional relationship is very important. (Schopler, 1989). The parents should be aware of the sensitivities of their child and know how to tackle with the problems. There are many experimental studies which indicate that it is better for the children with autism to stay at home but attend a public or special education school instead of living in an institution. However, to reach a successful result, the parents should be trained like a therapist to deal with their children. "Working parents at home is by far the best way of reducing problems of maintenance or generalization, as well as being a relatively economical form of intervention" (Howlin, 1989). If the therapeutic procedures are followed, it is possible to reach an optimal result by balancing the needs of both the child and other family members.

3.2 Education

The symptoms of autism differ from child to child. Therefore, individualized treatment and learning methods should be applied to reach improvement in the situation of the children with autism. In this sense, education is accepted in the literature as the only treatment for autism. (Southerington, 2007).

The aims of the education, as pointed out by Lorna Wing, is "to help the individual to live as fill a life as possible, to equip him to earn his own living, and to turn him into a useful citizen." (Wing, 1976:12)

3.2.1 Institutionalization

Institutionalization in the treatment/education of children with autism holds both advantages and disadvantages at the same time. Surroundings may be used in accommodation due to the needs of autistic children's advantage (Cook, 1994:36).

Studies has displayed that parent training has higher rate of success and generalization compared with the training done in institutions. The main issue here is the problems in making generalization since the autistic child cannot find a chance to generalize the learned behaviors to different environments (Sucuoğlu, 1997).

Another difficulty is about the designs of the institutions. The institutions, programs and facilities should be functional and designed according to the children's sensitivities. Aesthetics should also be at the center of the

architecture of the building. The research findings illustrates the dramatic impact of the environmental factors on the autistic children's therapy and behavior. Aesthetic consideration in the design of the institution may lift the limitations and make the children self-sufficient and independent. (Cook, 1994:37)

Role models are vital in the learning process of both handicapped and normal children. Therefore, if a child kept in an institution only for the autistic children, there would not be any role models to observe the normal behaviors (Akkök, 2003; Howlin, 1989).

The major problem of the parents of the autistic children in Turkey is the fear about the future. Since there is not any boarding institution in which autistic children would be cared for and trained, parents could not find an answer to the question of what will happen to their child, when they die.

3.2.2 Home Care

The deinstitutionalized treatment has developed in 1970's. By this development a need for home assistance programs, which offer wide range of services to the parent, gained importance. When the parents learned the fundamental principles and the methods of the training, they establish a healthy relationship with their children and the education of their children widespread the whole life. However, it has also been stated that the exaggerated attention to the children with autism has negative impacts on both the parents and other siblings. Other siblings' may feel discriminated and this may lead to the other problems on healthy children. Moreover, for the parents, the great weight of responsibility may result in "burn out".

To sum up it is not an easy choice to decide to care with the children with autism at home or at an institution. Therefore, the decision should be taken after the careful considerations by parents through discussions with support groups and experts

3.2.3 Group Homes

Group homes are another choice of treatment programs . Although they are intended mainly for adults, there are some group homes developed for the children as well. Residents of group homes usually have some type of chronic mental disorder that impairs their ability to live independently. The mission of the Autism Treatment Center is to assist people with autism and related disorders throughout their lives as they learn, play, work and live in the community. They are considered as an alternative of institutions and care programs. They could be described as the mixture of institutions and care programs since in this program the children with autism feel the comfort of home and have a chance to benefit from the advantages of the institutions. They also have opportunity of integrating into society in the group homes.

The group homes reached less success in practice than what is planned . The main reason of the relative failure of the group homes is the difficulties in the implementation. “Although the intention is to integrate the residents into the society, most group homes are located on farms with few neighbors. As a care facility, these homes provide excellent care for their individuals, but the autists are removed from society, an issue that was foremost to be avoided by the deinstitutionalization movements of the seventies” (Cook, 1994:38).

3.2.4 Speech and Hearing Centers

These facilities are developed as daytime therapy for few hours in a week. They serve important gains for the education of the children by appropriate approach in communication and speech. Speech and hearing centers are just like supplementary treatment, since they still allow the child to attend the other education programs.

In these centers the professionals take care for the appropriate training of the each children.

3.2.5 Mainstreaming

In the public schools, the children with autism and other handicapped children get the same education with non-disabled children at the same classrooms The staff of the public school do not receive a special training to assess the situation of the children with autism and create the individual programs for them. The autistic children's attendance to the public schools has disadvantages and advantages at the same time. Although this method have negative impacts on the school arrangements and individual therapies of the children, it has some advantages as well such as having chance to observe the suitable role models, to be present at the classroom and to adopt themselves to the normal life early (Cook, 1994:39-40).

3.2.6 Special Education Schools

In these schools both children who qualify to go to a mainstreaming school and children with severe disabilities get education for several hours together. The design of these schools therefore is extremely important for the well being of these children. In Turkey there are a few schools in this sense. However usually they cannot function proper enough because of the lack of funds.

The well-known educational approaches for autism applied in the special schools are the Applied Behavioral Analysis-ABA developed by Rosenwasser et al. (2001) and Treatment and Communication Handicapped Children (TEACCH) and Structured teaching developed by Schopler (1997).

Firstly, in the “Applied Behavioral Analysis - ABA”, Rosewasser et al. has focused on the achievement of compliance behavior, imitation activities, improvement in language abilities and usage and integration with peers (Stubbs and Cheng, 2005).

Second, the education approach of “Treatment and Communication Handicapped Children (TEACCH)” which is established at the beginnings of the 1970’s by Eric Schopler and colleagues, is developed for all ages and skill levels of autism. It is an evidence based service, training and research program for autistics. It provides not only clinical services including parent training and parent support groups but also consultation for teachers and residential care providers. Psychological, educational and biomedical studies are the research activities which are included in TEACCH program.

University of North Caroline at Chapel Hill also conduct a research to determine the needs of the children with autism. According to that, public school classrooms, a summer residential camp, group homes, social skills training, job training, and life planning services for persons with autism, respite care, before and after-school care, summer programs, recreational programs, group homes, other residential living options, prevocational training, and summer school programs should be designed developed for the children with autism.

These are the most famous education programs and teaching methods originated from USA (tulareselpa.org/Autism/Intervention.shtm):

- Children's Unit at the State University of New York at Binghamton
- Denver Model at the University of Colorado Health Sciences Center
- Developmental Intervention Model at The George Washington University School of Medicine
- Individualized Support Program at the University of South Florida at Tampa
- Learning Experiences, an Alternative Program for Preschoolers and their Parents (LEAP) Preschool at the University of Colorado School of Education
- Children's Unit at the State University of New York at Binghamton
- Pivotal Response Model at the University of California at Santa Barbara
- Treatment and Education of Autistic and Related Communication Handicapped Children (TEACCH) at the University of North Carolina School of Medicine at Chapel Hill
- Young Autism Project at The University of California at Los Angeles (UCLA)

CHAPTER 4

DESIGN GUIDELINES FOR SCHOOLS OF AUTISTIC CHILDREN

The lives of autistic children and their families are full of difficulties. Their sensory impairments, communicative problems and mental challenges affect the daily life of both children, their parents and siblings. The parents usually try to arrange their homes according to their child's needs in terms of space arrangement, level of light or colors, try to keep their child from disturbing noises or cook the meals they can eat. They also attentively keep the space as their child is used to. However sometimes these precautions are not enough and children have tantrums for reasons that the parents cannot understand or on the contrary withdraw into themselves that there is no way to attract their attention.

The life in the urban context is even more difficult. Once stepped out of the controlled environment of their homes it is harder to manipulate the environment. Making adjustments in the city according to these children's needs is very difficult. For one reason, children with autism exhibit many different characteristics. One thing that a child enjoys, might cause great stress for another. A hypo-visual child might enjoy looking at vivid colors while a hyper-visual child finds comfort with plain colors. For one child loud noises attract his attention for another loud noises would cause immense stress and result in tantrums. Furthermore it is very common that these children do not like change. Even a very small change in the environment they are used to, would cause great frustration, which is impossible to

control in the city context. Adding to this as mentioned before these children often exhibit problematic behaviors according to their obsessions. This may result embarrassing moments for the family, like when their child shouts “there’s a lavatory room” when he sees a frosted glass (Wing, 1976: 34).

As the awareness of the society increases about autism, the problems that have to be faced by individuals with autism and their close ones would undoubtly diminish. It is important to provide a safe and accessible environment for these individuals according to universal design principles, in the city, however an urban environment designed for autism is still an almost impossible challenge for the reasons stated before.

The education programs given in special education schools aim to treat the challenged aspects of children with autism, preparing them for a more independent life where they can cope with the difficulties of the outside world. Here the children acquire communication skills, gradually accustom to situations of stress and gain every-day and work skills. It might be difficult to change the outside environment according to these children’s needs nevertheless the special education schools try to change the children in order to gain abilities to cope with its challenges, in a more controllable environment according to their needs. These spaces act as a transition space to the actual world. Consequently providing an adequate and well-designed environment for the education of children with autism not only helps pupils in the learning process but also facilitates the job for the teachers. Furthermore it provides relief for the parents decreasing their preoccupation with their children’s future and needs.

In this chapter some design guidelines which can be adopted in a special school for children with autism will be discussed. First, general concepts

which are simplicity, calmness, order, flexibility and safety which applies to the overall school will be introduced. When designing a school for children with autism one must keep these concepts in mind at all times, from the design of the whole school to the design of education materials.

Second, further design strategies stressed by designers working with autistic children and caretakers of children with ASD will be covered. Namely the site selection, planning of the school, program elements, lighting, acoustics, color scheme and rhythm concepts will be reviewed. Following these the coating, paving and furnishing that are appropriate for a special school will be covered. These contents are gathered from interviews with teachers of autistic children, examples of special schools and other printed resources.

4.1 Schools for Autistic Children: Environmental Character

The design features of a school for autistic children will be dealt in details in the next parts. However, there are some important general design principles which concern the overall school. To begin with, the Building Bulletin (BB) 77, Designing for People with Special Educational Needs and Disabilities in Schools, published by the Department for Education and Employment in UK provides a wide range recommendations for the design of a special school. The document states that all schools but especially special school buildings, should be “attractive, fit for purpose, effective and convenient for everyone to use”. In addition to these, it is also essential that a special school “promote a positive sense of identity” with an attractive, welcoming appearance to give a sense of belonging, “Show a positive relationship with its surroundings”, “display a positive sense of place and aesthetics with well-proportioned spaces of appropriate size and

shape to suit the purpose for which they will be used" which also facilitates intuitive way finding, "be user friendly", "facilitate ease of movement" with a clear and simple layout providing comfortable room relationships, giving a sense of flow through and between the rooms or spaces and appropriate signage and way finding systems. The education environments in these schools should "enhance learning experiences", "offer multi-sensory stimuli" and "be age-appropriate". "A comfortable and therapeutic environment" which promotes "health and well-being" of its users with the use of appropriate," robust materials" enhances the learning experiment. Some other principles stated in the document, which a special school should possess are being "flexible, adaptable and sustainable" (BB 77: DfEE, 2005 Section 1.1.5).

Apart from these general principles, in the case of a school for children in autistic spectrum, some concepts gain more importance than others and need to be analyzed further. The specialists stress the need for a clear, simple and ordered environment for the well being of children. Equally important is the flexibility of space which facilitates the learning process both for children and their teachers. Last but not least is ensuring the safety of the education environment without compromising the independence of children or overwhelming them by making them feel observed all the time.

4.1.1 Simplicity, Calmness, Order

The building which cares for the autistic children should be very simple due to the consideration of their needs, sensitivities and obsessions. Therefore, there are a number of issues that should be dealt when studying on the architecture of the building. A clear layout and an easily predictable plan

helps children to use the building without getting confused or over-stimulated. When the children use less effort to navigate through the building or to understand the layout of a classroom s/he would be able to concentrate more on his/her educational activities. In the Building Bulletin mentioned before, special importance is given to the simplicity and clarity of a special school which will be designed for autistic users. It says because the students may have difficulty in interpreting their surroundings and become anxious and distressed with a complicated navigation system, the building should have “a simple layout which reflects order, calm, clarity and has good signage and way finding”. It adds “simple or reduced detailing and changes of plane may reduce the opportunity for obsessiveness”.

Considering the main features of autistic people, architect Simon Humphrey who has a wide range of experience in designing for autism, and brother of an autistic individual, put out how a building should be designed for the autistic children. According to Humphrey (2008), the building should be simple and carry a calming effect on the user considering the users’ sensitivities. He reflects the idea of simplicity and predictability on his school plan designed for autistic children (**Figure 4.1**). Here, the separation of the Junior and Senior schools is yielded by the main communal and administration departments. The architect places the classrooms around a courtyard, defined by the golden spiral. He claims that with the help of this continuous courtyard wall, the users have a constant source of reference when they circulate around the building. Humphrey claims that this would diminish the complexity of circulation and provide calmness, order and clarity by giving reference to the children where they are when they exit a classroom and how to find their next location (2).

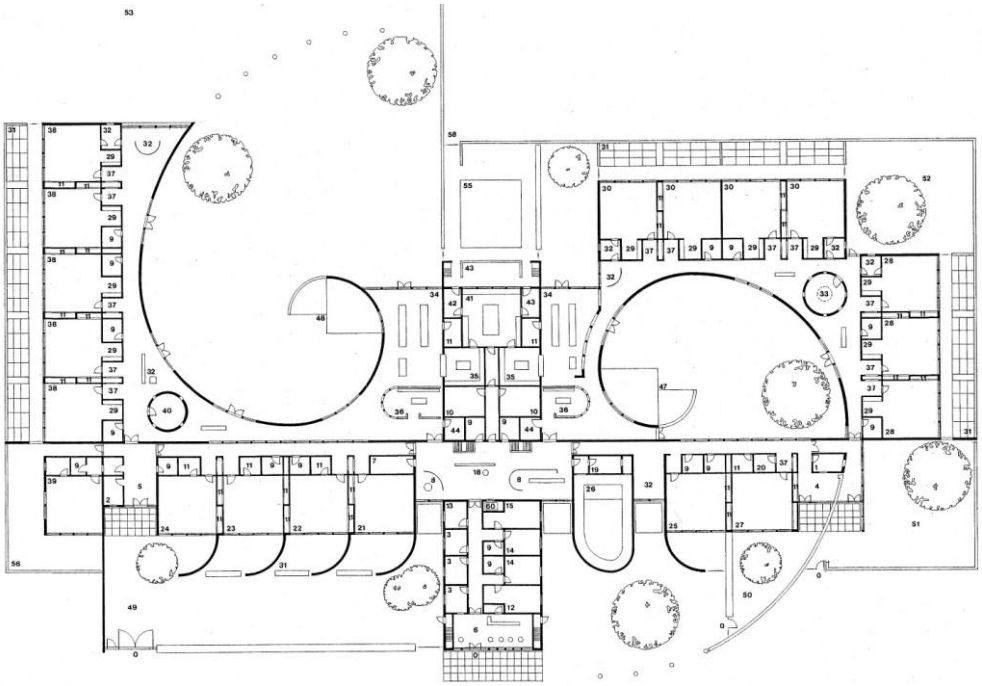

Figure 4.1: Plan of School in Newcastle by Simon Humphreys (Humphrey, 2008:2)

Similarly Teresa Whitehurst, a research and development officer in Sunfield Research Institute, in her paper “Evaluation of Features specific to an ASD Designed Living Accommodation” tells about her observations in a living environment designed for children with profound autistic spectrum disorder which adopts a curvilinear corridor wall. She claims that children seem to find it easier to navigate in the building by “placing their hands on the walls and following the contours round the corridor” (Whitehurst, 2006:4). Architect of the building Christopher Beaver agrees on this by saying that “the curved walls help some children to move through the building as they like to follow the curve and avoid sudden corners” (Beaver, 2006).

Needless to say, it is not compulsory to adopt a curvilinear form for simplicity. Any ordered and intelligible plan which provides easy navigation and takes into account the users' sensitivities would be effectual for autistic children.

The sense of calmness and simplicity is achieved not only by a building's plan but also the materials used. The use of materials has to be seriously considered when building a school for autistic children. The subject will be further discussed in the following section, however it is important to emphasize here, too many details in the used materials may cause stress on autistic users. These may result in obsessions or distractions for a child. Reducing unnecessary details may provide a tranquil environment which is necessary for the education of autistic children. Simon Humphreys, again in the subject of simplicity and calmness, gives an example of a reduction of details around a window (**Figure 4.2**). Here the architraves and the skirting are annulled (Humphreys, 2008:4).

Figure 4.2: Reduction of details around a window (Humphrey, 2008:4)

Nevertheless, the concepts of “simplicity” and “calmness” should not be understood that the place should look almost institutional. Contrary to this, the building designed for the autistic users should be comfortable to help them to relax and concentrate on their education. The learning environment should be structured in order not to make students feel overwhelmed by the excess of stimulants. However, it is also important to balance it, since due to the lack of stimulants, they may withdraw into themselves as well, “with nothing to attract their attention” (Cook, 1994:49). The main aim should be to take the child’s attention to the appropriate learning material. Similarly, the teachers of autistic children state that instead of excessively isolated classrooms, they prefer classrooms which resembles children’s natural setting as much as possible. In this way, the child would not need to bare extreme difficulties in the adaptation of his/her environment outside the school (Personal interview with Karasu, Şahin and Mercan, 04.04.2009).

In the article “Classroom Design for Living and Learning with Autism” Clare L. Vogel stresses the importance of a comfortable surrounding as well. She affirms that a classroom designed too sterile might remind the children of hospital environment and cause stress (Vogel, 2008). Therefore, the sensibilities of the users should be taken into consideration and the balance should be tuned carefully.

4.1.2 Flexibility

The balance between an overwhelming crowded space and a space which is too much isolated can be attained by being able to change a room according to the needs and preferences of a child. Since these children differ from each other in terms of their likes and dislikes, flexibility becomes

another important concept which is stressed by the people working with autistic children. Claire Vogel defines the flexibility concept for children with autism as “being able to transform an environment on a moment’s notice” rather than “constant change” which might anyway trouble children with autism who are addicted to their routine and panic because of any little change in their environment. She addresses “furnishings, spatial arrangements and lighting solutions as the starting points for the transformation of the environment” for the children with autism from which both students and the teachers would benefit. Vogel suggests portable screens or dividers for creating more intimate spaces for individual or group education, upon desire. These movable platforms also enable children to create new arrangements in which they feel more at ease (Vogel, 2008).

Moreover, during their education, one of the most important accomplishments for autistic children is letting their obsessions and fears go. In a situation where the child is over-sensitive to some noise or light, or has an obsession about a material in the classroom, the teachers gradually and systematically accustom the children to the object of obsession, fear or discomfort. Therefore, the flexibility of the education environment has a crucial role for the sensitivities and obsessions of these children. The teacher should have the opportunity to move around the furniture, adjust the glare of a light source or rearrange the classroom according to the needs of different children (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). The traditional Japanese house may give an idea of flexibility in this regard (**Figure 4.3**). In these houses, the space can be divided in sections with mobile panels and many fixed size carpets.

Figure 4.3: Traditional Japanese house (ojisanjake.blogspot.com/2009/11/traditional-japanese-house.html, accessed on 07.05.2009)

In general, specialists propose designing a rather neutral sensory environment for children that can get distracted by the excess of stimulants because it is more convenient to introduce additional sensory stimulus afterwards, for children that are harder to stimulate and need extra stimulants to keep their attention alive. Rather than removing excessive stimulants from the environment like soundproofing or changing the textures of walls or paving, it would be easier to introduce small changes into an education environment, like adding a piece of sandpaper for children who enjoy the sensory input of different textures or adding music for those who learn better with soothing sounds (Mostafa, 2008: 204).

4.1.3 Safety

In addition to the concepts of simplicity, calmness, order and flexibility, another important concept is the safety. Physical and emotional safety and security of the students have a considerable role in the education of the children with autism. Creating a safe environment for autistic children may

not be easy for designers and teachers. These children may tantrum or have seizures during which they might hit somewhere or throw an object which may endanger themselves and/or others.

Teachers also underline the importance of a safe environment by emphasizing that the less control they put on the child, the more s/he becomes independent which is the ultimate goal of their education (Personal interview with Karasu, Şahin and Mercan, 04.04.2009) Similarly in the section for children with autism in the Building Bulletin of UK Department for Education and Employment, it is stated that “there is a need to balance security and independence and to find the right mix between tough materials and special equipment on the one hand and ordinary, everyday items on the other, in order to avoid an institutional appearance whilst at the same time eliminating risks” (BB 77: DfEE, 2005 Section 2.3.2).

Consequently, the space for autistic individuals should be carefully designed in each step, thinking of every possible danger. The glass surfaces might be prone to be broken down considering the objects thrown during a tantrum. Added to that due to their peripheral vision, the children might not realize a bump on the corridor or a threshold and stumble upon these. During an interview, the teachers of the children with autism have told cases about an autistic child who did not see a marble step, fell down and hurt his head badly,. They also complain about radiators, how some children fixate on their adjusting pinion and turn them continuously or how they stumble upon the radiators and hurt themselves (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). “Wiring, open stairways, unscreened windows, loose flooring or toxic paints” are some of many hazards which jeopardize children’s safety (Vogel, 2008). It is recommended to use “robust materials” where there are pupils with severe

disabilities, and safety precautions to be taken for “doors, windows, glass, plaster, and piped or wired services” (BB 77: DfEE, 2005 Section 2.3.2).

In addition to the safety of the interior education environment, it is also important to provide secure external spaces for the children with autism. Again the degree of control and restrictions should be tuned attentively in these external spaces because as it is stated in Simon Humphreys’ (2008) article, it is essential in a garden that the children “are able to wander free” and experience “a feeling of open space” while the caretakers are “comfortable that the child can wander in safety” (8). One has to bear in mind that providing an over-protective environment might result in an inanimate and unstimulating school so it is necessary again to balance the degree of safety precautions to be taken in the school which also allow students to prepare for the “uncertainties of everyday living” (BB 77: DfEE, 2005 Section 4.3.1)

4.2 Design Guidelines For The School Of Children With Autism

The concepts of simplicity, calmness, order, flexibility and safety have already been discussed. There are some other key elements in which attention should be paid while designing a space for autistic users. To start with, the site selection should be done carefully. The school should be built in a neighborhood with easy access and it should be near social activities which children can benefit from. In the design strategies for the school of children with autism, lighting, acoustics, color scheme and rhythm also play an important role. Additionally the design of a classroom have a great impact for the education of a child with autism.

4.2.1 Site Selection

To begin with, the site selection for the building is important for children's safety and provision of a socially enriching milieu. Besides the proximity to various social activities, it is essential that the school building does not shelter any public spaces like taverns, coffeehouses, bars, or electronic game centers and any place where alcohol is served (MEB, 2007).

When building a school for children with autism, site selection is of great importance. It is desirable that the school is built on an easily accessible site where various social activities take place in the surroundings (MEB, 2004). The social activities and recreation spaces that take place in schools for children with autism, like hydrotherapy pool, outdoor spaces for gardening, playground or therapy with animals[1] require a rather large area. It might be difficult to find such a large site to fulfill all these activities, in the city center. Consequently some schools are preferred to be built off the city center on larger sites, some more modest schools are built in the city center, taking advantage from the social activities of other schools or institutions in the surroundings.

In addition to these, there are examples of schools which share their own facilities with the public[2]. Some are built next to a mainstream school to encourage social interaction.

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[1] Playing with animals is a very successful therapy to increase social and communicative skills in autistic children. These animals can vary from small sized animals like rabbits, ducks, dogs or cats, to larger animals like horses.

[2] Some examples are: Addington School designed by Hampshire County Council's Architects Department, Osborne School designed by Hampshire County Council Architects (Dudek, 2007:102-103)

Using the same facilities with normal children, can enable children with autism to interact with their peers which can set a role-model in their lives and to improve their social skills by mimicking them. This arrangement is also beneficial for the public, in terms of getting to know autism and learning to coexist with individuals with ASD (Personal interview with Akkök and Sucuoğlu, 17.11.2009).

In some cases an education center for children with autism is built next to a normal school sharing external play areas and social facilities. This is a desirable strategy since both sides can benefit from sharing notable time and getting acquainted with each other without sacrificing the necessary requirements of a special school. Gülay Karasu claims that children learn better by observing their peers than adults. By trying to mimic, them they gain notable language and social skills. Even if children with autism cannot attain their peers academically, in terms of adjusting these arrangements to society can be very beneficial (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). A special school founded in Sursee, Switzerland is an example for this case. The special school built later on the site adjacent to an existing mainstream school (**Figure 4.5**) encourages the physical relationship between the two by sharing external play areas, sports and multi-purpose hall, both visually and physically. The architectural firm Scheitlin – Syfrig + Partner which designed the building have composed two open-air courtyards where both the schools can use. The access for the lower play court on the east and the upper area for sports on the west, is secured through a large staircase beneath the new building (Dudek, 2008:99) (**Figure 4.4**).

The school is also favorable with its highly glazed entrance which is also used as a gallery for the work of all the students. On the ground floor, the library and what architects describe as a “retreat” place where students can

sit and relax are also shared between the two schools and enable social interaction. On upper floors the special school keeps its autonomy serving only to special students with practical teaching areas, therapy rooms, workshops for arts and crafts and a demonstration kitchen (Dudek, 2008:100).

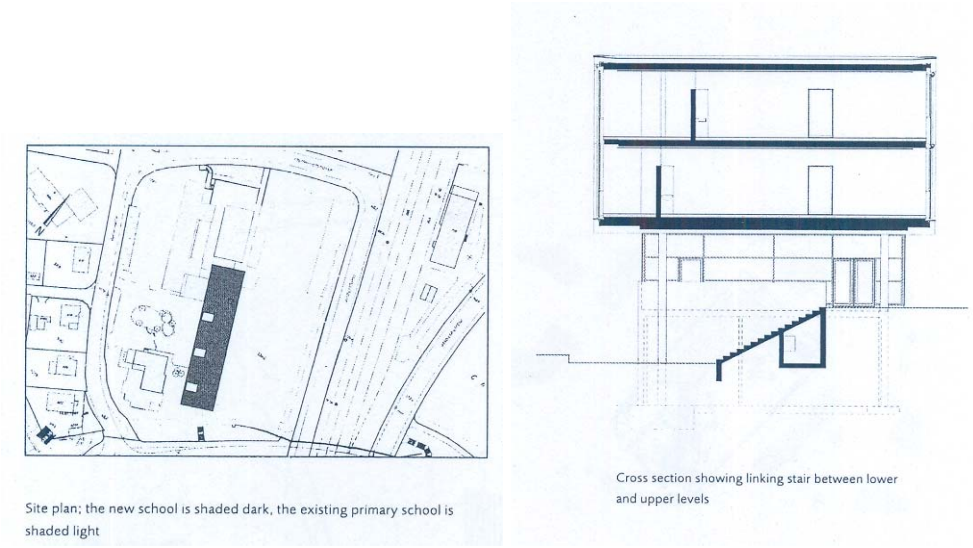


Figure 4.4 From left to right: Site plan and cross section from Special School Sursee, Sursee, Switzerland / Scheitlin – Syfrig + Partner (Dudek, 2008:100)

Figure 4.5: Special School Sursee, Sursee, Switzerland / Scheitlin – Syfrig + Partner (scheitlin-syfrig.ch/flash/main.htm, accessed on 22.12.2009)

Apart from the social advantages or the accessibility issues, the physical characteristics of the site has notable importance for the design. Building Bulletin (BB) 77, Designing for People with Special Educational Needs and

Disabilities in Schools, (updated 2005), published by the UK Department for Education and Employment, in the subject of the site, states:

> The school should have a suitable practical shape in relation to its function. Whilst it is recommended that the site should be relatively level, the designer should be aware of issues, such as steeply sloping, restricted or difficult sites, and offer the optimum solutions for overcoming problems with approach and levels or travel in the early design stages so as to avoid difficulties later. Sometimes changes in level can be exploited positively for split-level two-storey special schools, which offer external access to ground at both levels (BB 77: DfEE, 2005 Section 4.2.4).

4.2.2 Planning of the school

Every special school has its own planning layout affected by many factors, beginning from the location, shape and slope of the site, and orientation, in addition, the relationship related to adjacent buildings, roads, the requested program etc. When designing a building for special children, an architect has to consider all these factors, together with the needs of each children by conducting serious studies with caregivers and teachers. The general characteristics which a special school should encompass have already been discussed in the previous section. In addition to those, it is suitable to add that specialists usually prefer a single storey form in special schools for accessibility and safety reasons, if possible.[3]

The schools may adopt different schemes according to different conditions. One important aspect is to plan different units according to age and ability groups, consistent in itself. Planning separate entrances for older children,

[3] Some examples are: Stephan Hawkins School, designed by Haverstock Associates; Pistorius School for Disabled Children, designed by Behnisch, Behnisch & Partner; Karviaistie Special School, designed by Kirsti Siven & Asko Takala (Dudek, 2007:92-97, 100-101); residential accomodation for autistic children in West Midlands, designed by Christopher Beaver (autism-architects.com)

post-15 is also preferred in many schools (Personal interview with Arslankurt, 07.05.2007).

Here one favored case will be given to illustrate a warm and embracing design concept for a special school. The Pistorius School for Disabled Children designed by architects Behnisch, Behnisch & Partner, serve children with mental or physical handicaps and is the result of an architectural competition run by the municipal government of the Heidenheim district in Germany (Dudek, 2008:94). The planning of the school is executed with a “family house” concept in mind providing independent instruction areas while keeping a sense of integrity throughout the school with a coherent architectural language. The classroom blocks are organized in a U shape enclosing a small courtyard for each ‘family’ space from which connections to other adjacent classrooms are provided (**Figure 4.6, Figure 4.7**). Mark Dudek describes this spatial arrangement by saying that “from the security of their ‘home bases’ they can venture out into the slightly less secure yet protected terraces and landscaped mini courtyards which relate spatially to each classroom”. A central gathering space provided for each unit constitutes a “symbolic heart” for the classroom areas and is covered by a “barrel-vaulted skylight that filters daylight into the heart of each individual ‘family’ space” (Dudek, 2008:95). This type of a plan might create a sense of belonging to the school, eliminate the disturbing feeling of an institutionalized environment and help children to relax in a family-like organization which enables them to attain important skills for their everyday life routines.

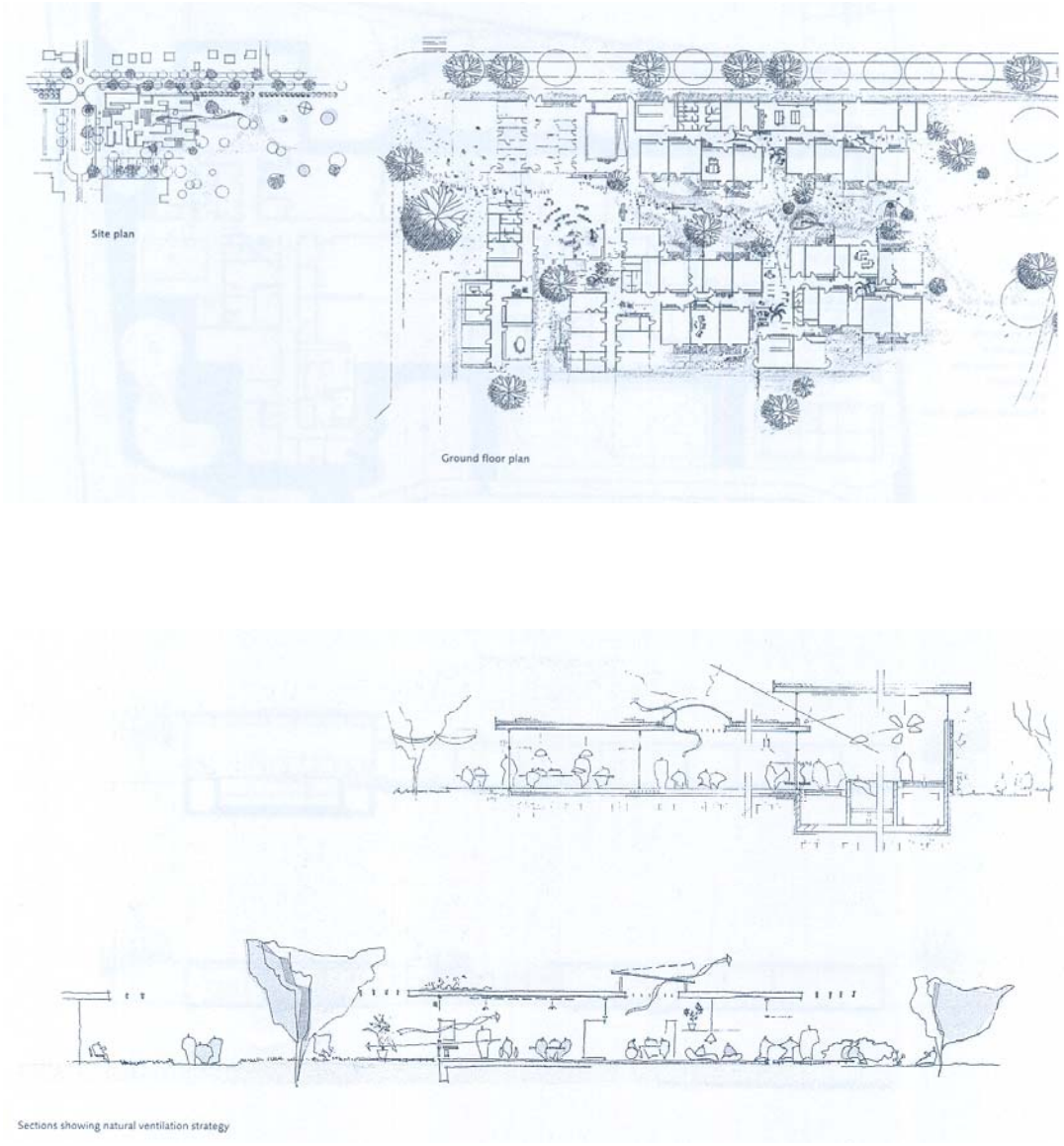


Figure 4.6: Plan and sectional drawings of the Pistorius School for Disabled Children / Behnisch, Behnisch & Partner (Dudek, 2008:95)

Figure 4.7: The Pistorius School for Disabled Children / Behnisch, Behnisch & Partner (imagineschooldesign.org , accessed on 22.12.2009)

A good organization of different spaces in the building is also crucial. It is important to provide a mixture of large and small spaces for children since some might be frightened in large open spaces and might need to withdraw to a smaller space, while others would not feel comfortable in an enclosed

one (BB 77: DfEE, 2005 Section 2.3.2). The schools are constituted of small spaces like classrooms or therapy rooms together with larger spaces like sports hall, dining area, or large multi-purpose rooms. Architect Magda Mostafa (2008), in her paper “An Architecture for Autism: Concepts of Design Intervention for the Autistic User” claims that children with autism, do not conceive space in “conventional functional zoning” they rather identify the architectural environment according to “sensory zoning” (205). In conclusion the concept of “sensory zoning” should be introduced to a school for children with autism, respecting the “autistic logic”. In a special school some places offer a “high-stimulus” environment which “require a high level of alertness”, like music and art rooms, ateliers or gymnasium. Classrooms where individual or group therapies take place or the speech therapy rooms provide “low-stimulus” places. Magda Mostafa suggests to group these high-stimulus environments together and likewise gather low-stimulus places together. She also proposes to separate high-stimulus services like bathrooms, kitchens, staffrooms and administration where children do not use, from low-stimulus zones. The service spaces which children will use should also be situated “near the high-stimulus zones and as far as possible from the low-stimulus zones” (205). This arrangement which offers a sensory coherence for students, improves their performance in school, and decrease the time needed for calming down and adopting to the new environment, by reducing the problems of distraction and diversion (Mostafa, 2008:205).

Furthermore the regulations about special schools in Turkey have some obligations about the spaces in the special schools. According to this regulations the ceiling height should be 2,50 m from the floor to the beam, and the overall height cannot be less than 3 m. In a case where education environments cannot meet these requirements, the student quota is calculated in order that each student have 7 m^3 of space (MEB, 2007).

4.2.3 Program Elements

In this section different program elements which can take place in a school for children with autism will be defined. Some of these elements are not compulsory nevertheless they contribute to a better environment for education. The regulations for Education Centers for Children with Autism (OÇEM) published by the Republic of Turkey Ministry of National Education, stresses that these centers should shelter the features of an independent education facility which provides appropriate education according to the characteristics of children with autism. Moreover, peculiarities of children with autism should be considered while designing the physical layout of the center such as therapy rooms, toilets, kitchens, educational and social spaces. Choosing the right materials for construction, paving and coatings are also crucial (MEB, 2004).

OÇEM regulations list a number of spaces for the education of children as well as spaces for the staff working in the school. According to this document, an Independent OÇEM, should shelter individual and group therapy spaces, formed according to children's individual differences. The center should also take the needs of the children into consideration. Therefore, the design of the center should include music rooms, a gymnasium, art workshops, multi-purpose rooms, demonstration kitchen and living room, observation rooms, playground, and appropriate toilets etc. The rooms for the employees who would work in these centers should be added to the building. According to the list of employees, a director, director's assistant, special education teachers, advisors, psychologist, child development specialist, physiotherapist, master teacher and service assistants should be employed in the center and should be provided with

appropriate work spaces (MEB, 2004). The possible program elements listed in OÇEM regulations and other education spaces used in abroad special schools for children with autism will be listed below along with some suggestions about their design.

4.2.3.1 Entrance Hall

The entrance hall should be welcoming and should not shelter stressful elements for the child. It is important that the space is bright, open and welcoming and reflects the school's image. An information desk can be positioned in this space. There should also be enough space for parents to sit and wait for their children. For the normal siblings of autistic children who come with their parents, a small playground can be integrated into the waiting area. Similarly Gülay Karasu, director of Private İlgi Special Education School, says that a separate room for mothers to breastfeed or change diapers of younger siblings can be very helpful for parents (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). In schools with a closed circuit camera system, there should be enough space for parents to watch their children undergoing therapy sessions from a monitor. It is desired that these monitoring spaces are located close to the entrance halls, since the entrance of the parents to the classrooms or therapy areas is not preferred due to the possible distraction of the children.

4.2.3.2 Education Spaces

The education for children in the autistic spectrum are realized in classrooms with different sizes from small individual therapy rooms where

one to one therapy is done between the teacher and the child, to larger ones like occupational therapy rooms or workshops. For the layout of a classroom, the concepts calmness, flexibility and safety that are previously stated have a great importance.

Different from a normal classroom layout, it is desirable that these education spaces have a preparation area while entering the room, a separate withdrawal area for the times when the child gets overwhelmed and wet spaces with washbasins if needed, so that neither the teacher nor the child has to leave the room while doing activities which necessitate water.

An example of classroom designed by Simon Humphreys for Newcastle City Council can be a good example of a classroom design which responds to the needs of children with autism. As it is shown on **Figure 4.8**, Humphreys tells how the architecture of the classroom could make the life easier for the children with autism:

> A small gathering space is located before entering the room (A) to allow the teacher to prepare the children to enter the room. No thresholds exist at any doorway. The classroom has a withdrawal space located off it (M) which can also be accessed from the main circulation space. A protected external courtyard is accessed directly from the classroom (O). A wet room is located off the classroom. (L) A barrel vaulted roof, approximately 4 meters to the top provides good natural ventilation. Under-floor heating is used, storage is in the walls. All light switches are hidden from view. Side panels for one to one focus. The view to the outside is contained causing less distraction (Humphreys, 2008:10).

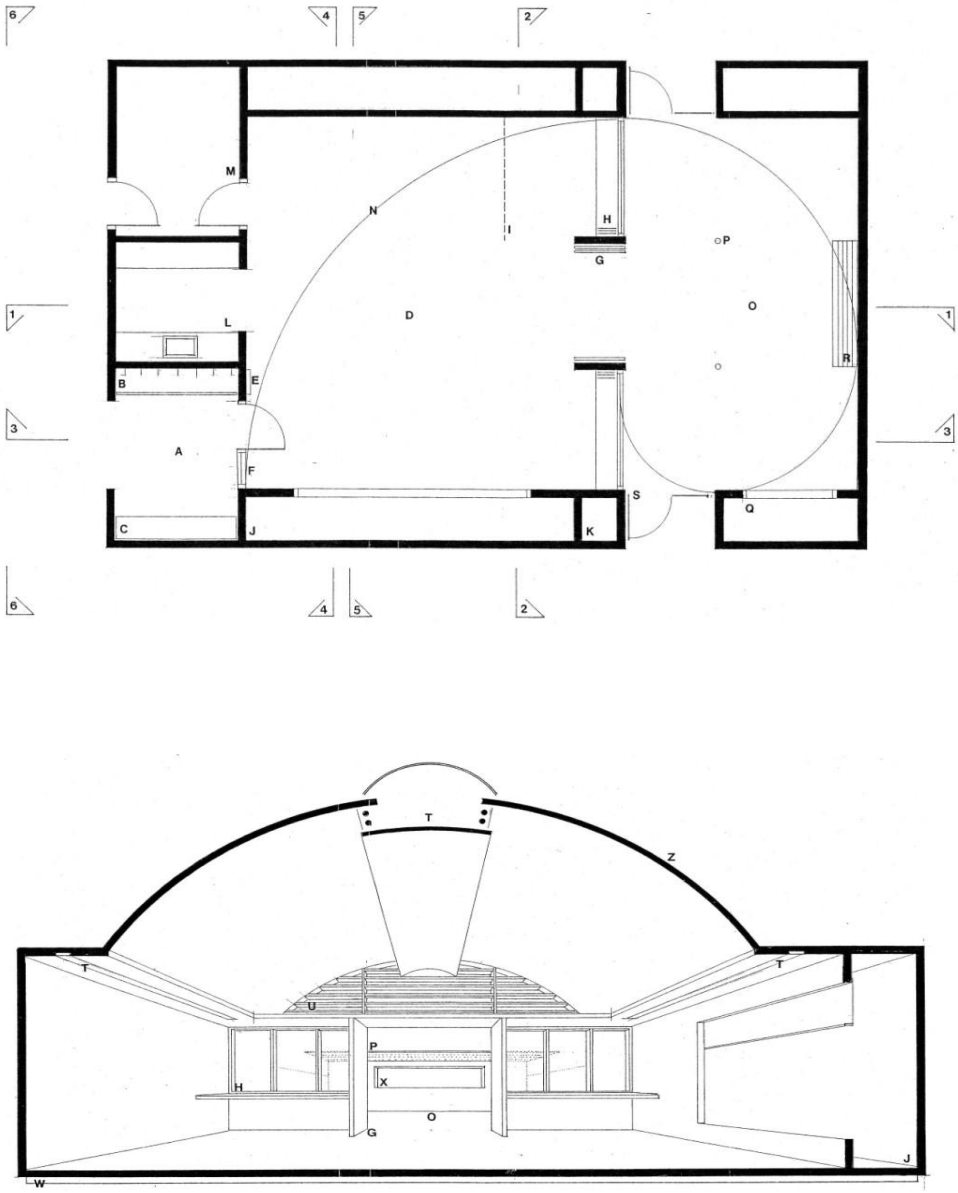


Figure 4.8: Plan and section of classroom design, Newcastle City Council / Simon Humphreys (Humphreys, 2008:10)

Besides providing a non-overwhelming and safe environment for the education, one must design flexible classrooms to allow the teachers to employ different teaching methods in focused, structured activity spaces. Çetin Şahin, a teacher in Private İlgi Special Education School, claims that

he prefers large rooms which can be divided into smaller and more private parts so that when a child accomplishes a task successfully he may play or romp with the child in a different part of the room possibly coated with soft materials.

Similarly architect Magda Mostafa, in her paper “An Architecture for Autism: Concepts of Design Intervention for the Autistic User”, suggests a parallel classroom design. The layout model which she calls “spatial sequencing” is one of the two important aspects in the design of a space for autism which is deducted by the questionnaire study she made with first hand caregivers of autistic children. The “spatial sequencing” in a classroom is realized by “the organization of the functional spaces of the classroom, within which a single activity is carried out, into ‘stations’ or separate defined zones, including an ‘escape space’” (193) (**Figure 4.9**). This concept is recommended for increasing concentration since it provides smaller amount of sensory environment for a child to assimilate (Mostafa, 2008:204). Consequently, Mostafa claims that “universal or multifunctional spaces, such as ‘open-plan’ classrooms, should be avoided to reduce sensory confusion” (205).

Figure 4.9: Example of a layout of classroom (Mostafa, 2008:194)

Common characteristics of children with autism like the need for stability and routine, and the difficulty to adopt to change have been discussed in the previous chapter. Magda Mostafa suggests to use these specialties in favor of education, by creating a predictable environment in the classroom where each task is executed in its own compartment. Mostafa suggests that by “catering to the child’s need for routine, he or she may be more open to learning essential skills that can be generalized outside this controlled space, making him or her ultimately less dependent on the routine” even though the real world does not have such compartmentalized stations or does not satisfy the need for the routine (193). Another advantage of this classroom layout is that it eliminates the need for going from one classroom to another for different tasks. Consequently the child does not loose valuable time for concentration which sometimes is very difficult to preserve in transition spaces (Mostafa, 2008:205).

Another aspect which affects the design of classrooms is the need to provide opportunities for the parents to observe their children. Besides giving possibility to the parents to follow the progress of their children, watching therapy sessions with the teacher, could also give reference for the parent to understand how they could cope with their children’s problems and continue their education at home similarly. Observation opportunities can be established in two ways, one is closed circuit camera systems and the other is to provide observation rooms next to classroom areas with a one way mirror in-between (Personal interview with Akkök and Sucuoğlu, 17.11.2009). The observation process should be discreet in order not to disturb the concentration of these children which is very difficult to attain time to time.

4.2.3.2.1 Individual Therapy Room

Individual therapy rooms are used for one-on-one therapy between a teacher and student. These rooms should be minimum 6 m^2 according to Special Education Schools Regulations published by Republic of Turkey Ministry of National Education (MEB). There should be minimal distraction in this room. Appropriate storage units which provide place for materials to be hidden from view should be considered within the therapy room. Hiding a desired object in the storage units is a technique commonly used by teachers. The deprivation of the desired toy, force the child to establish communication by asking the teacher to pick it up for them, from the closed storage unit. It is important that these rooms are situated close to restrooms and to the sensory and swing rooms (Southerington, 2005:34).

4.2.3.2.2 Group Therapy Room

For the group therapy rooms at least 15 m^2 area should be provided. For these rooms minimum 2,5 m^2 of space should be ensured for each children. The number of maximum autistic children who can be educated in play and activity rooms is 4, while this number can be 10 for children with other disabilities (MEB, 2007). Due to the variation of activities in the group therapy rooms, the flexibility of space is crucial. Similar to the individual therapy room, having hidden storage which prevents the distraction of the children with the clutter is very important in the group therapy rooms as well. In addition to the storage units, the wash basins in the group and individual therapy rooms which would facilitate the education process should be considered. Gülay Karasu underlines the importance of the wash basins since they would make it possible for the children to wash their

hands when dealt with paint without leaving the classroom (Personal interview with Karasu, Şahin and Mercan, 04.04.2009)

4.2.3.2.3 Early Childhood and Relaxation Room / Crisis Room

In Turkey, according to the Ministry of National Education the schools for the children with autism has to have a small scale time-out room which are used when a child feel over-stimulated and need time to calm down away from all distractions and people. In these rooms, called “early childhood and relaxation room” which can be minimum 6 m^2, 1,5 meter from the ground of all wall surfaces should be covered with soft foam rubber, the floor covering should also be soft and has to have a plain color carpet (MEB, 2007).

It is important to note that in the building of İlgi Protection of Autistic Children Foundation, this room was built because it was obligatory in the regulations of Republic of Turkey Ministry of National Education, yet it is currently used as a music room. However one should consider the fact that the building is currently used as a course institution and children do not spend much time in the building other than 2 to 3 hours of education. In a special school for autistic children, the pupils would stay much longer in the building thus they are more likely to feel overwhelmed. Consequently in the context of a school, these rooms might not be too unnecessary. Still the problem of overstimulation can be solved by sensory rooms which are, contrary to Turkey, widely used in abroad schools for autistic children.

4.2.3.2.4 Swing / Sensory Room

Besides these rooms' different purposes such as a reward or relaxation, the main aim here is to provide a sensory environment with the opportunity to enhance and balance children's sensory systems. The concept of sensory room has been developed in Netherlands by Hulsegge and Verheul. "They can be in different forms such as, white, dark, water, soft play, interactive, sound or garden. Their main functions tend to be therapeutic, educational and relaxation, all in relation to development" (BB 77: DfEE, 2005 Section 4.10.8).

These rooms can be either one large 'white room' of 24 m^2 or two small rooms of 12 m^2 for separate 'white' and dark rooms. 'Dark rooms' with dark walls and ceilings, from which daylight can be excluded, support light-stimulation work (**Figure 4.11**). Children with very poor vision are encouraged to develop skills in light awareness, scanning, tracking and fixation (BB 77: DfEE, 2005 Section 4.10.8). Apart from the light play, swings, mirror balls, bubble tubes, mirrors, fiber optics, tactile materials, cushions beanbags, squeeze chairs (**Figure 4.12**) or squeeze machines can be introduced into these rooms for sensory balancing, improvement in coordination and understanding of cause and effect, as well as the calming effect of swinging or to be squeezed in a tight place[4]. It is important to consider the structure in this room, since from the ceiling multiple swings will be hung (Southerington, 2005:35).

[4] The squeeze chairs are a commercial replicate of the squeeze machines designed by Temple Grandin to calm and restrain livestock. As an autistic individual herself, she states that she used to get into these squeeze machines since the pressure calms her, releives anxiety and helps her to regain her thinking process (Grandin, 2006, 59)

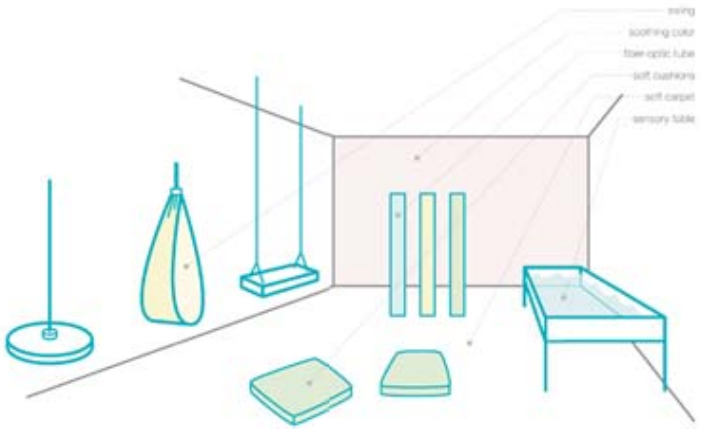


Figure 4.10: example of a swing/sensory room (Southerington, 2008:48)

Figure 4.11: Example of a dark sensory room, Ifield Special Needs School / Haverstock Associates (www.haverstock.com/pages/educationmainparent.htm, accessed on 22.12.2009)

Figure 4.12: Squeeze chair (web.mit.edu/vap/workandresearch/workfaculty/work_jacob.html, accessed on 03.05.2009)

The equipments in these rooms should be chosen according to the needs of the individuals who will use it. Sensory rooms offer a range of experiences related with the light, sound, touch and smell. To sustain stimulation for all sensory systems, calming music, vibrating cushions, fiber optics, mirror balls, bubble tubes, water beds, tactile walls, disco lights and projectors can be included. Different range of therapy and learning activities are designed for facilities. It is also expressed that the age appropriate environments are recommended. Therefore, the equipment should be searched attentively to care for the detailed design of these spaces.

4.2.3.2.5 Music Therapy Room

Pupils can benefit greatly from music therapy, using technology, instruments and tools which encourage communication and interaction. Music therapy is widely used in special education schools for autistic children to develop self-expression and creativity, enhance self-esteem, self-confidence, and social and interaction skills.

According to special education schools regulations in Turkey, like all activity rooms, these rooms should be minimum 15 m^2 and should provide at least 2,5 m^2 space for each children (MEB,2007).

These rooms should provide good acoustics with sound absorbent materials to decrease reverberation and high levels of acoustic insulation. There should also be adequate storage for musical instruments and the furniture should allow sufficient clear space for loose furniture and free-

standing or desktop instruments such as piano or drums, keyboards with computer interfaces, hand-held instruments, and sound beam or resonance boards (BB 77: DfEE, 2005 Section 4.6.5).

4.2.3.2.6 Computer and Listening Station

This room is designed for providing computer aid to the children in their education. By the development of technology, new computer programs which may have a positive effect on the children with autism are developed. The use of sound absorbing materials to decrease the reverberation time in these rooms is important since the sound coming from the fans of computers may derange some children.

Moreover, the calming effect of different kinds of music is also used on children with autism in the computer and listening room where a small place of the room is reserved for playing calming music for the children (Southerington, 2005:35).

4.2.3.2.7 Speech Language Pathology Room

Although this room is designed similar to the small therapy rooms, the purpose of its usage differs from that. Professionals' activities such as speeches, language and pathology therapies take place in these rooms (Southerington, 2005:35). The main goal of the speech and language pathology room is to reach the communication potential of the children with speech, language and communication difficulties. With the help of the education in this room children would achieve independence of their life due to their improved communication capabilities. Acoustic separation and

sound insulation in this room is needed to prevent disturbance from other activities. Moreover, mirrors should be considered for the articulation studies. Storage is required for equipment such as cards, books, games, objects of reference, sensory equipment, voice-output boxes with buttons and sounds, and electrical or electronic equipment (BB 77: DfEE, 2005 Section 4.10.4).

4.2.3.2.8 Occupational Therapy Room

The occupational therapy rooms are used for the multi physical activity purposes. The main goal is to help the children in reaching maximum functional performance, while developing independence and self confidence.

Therefore, compared with the small therapy rooms the occupational therapy rooms should be larger, ensuring an area of minimum 15 m^2 (MEB, 2007). Registered occupational therapists perform the activities of direct occupational therapy in this room (Southerington, 2005:35). In these classes the simulations of the real world could be made to teach children how to cope with the daily life. They would learn shopping from bakery, acting in the hospital, making tea in the kitchen. The simulation of these activities give possibility to the children to feel themselves safer when they actually go for shopping or to the doctor.

In the schools designed specifically for the children with autism, a demonstration kitchen is widely used for improving the usage of the kitchen utensils. Adding to this a demonstration living room is also a great help. With these simulations, occupational therapists evaluate functional abilities of the children with autism including “the motor, sensory, perceptual, social

emotional and self-care skills in many areas" (BB 77: DfEE, 2005 Section 4.10.3). Consequently a large room and integrated water basins are needed for the simulation exercises conducted in the occupational therapy room.

4.2.3.2.9 Workshops

The most disturbing fear for the parents is the high possibility of their death while their children is alive. Since, in such a situation the children will be alone, it is very important for a child to learn to live independently and gain necessary skills to perpetuate their lives alone. If they do not possess enough academic success to attend a normal school, they could have the ability to develop different skills to earn money. Gülay Karasu informs that these children are usually very talented in fields which require a good eye with details, like repairing musical instruments, watches or other objects or sewing. Adding to their ability to perceive details, some have a very good ear for music and can tune a musical instrument flawlessly (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). Therefore, the children could turn their sensitivities to an advantage in these ateliers and they could develop their skills according to their interests and abilities. In the atelier of Private Ilgi Special Education School, children enjoy painting, making "ebru" (water marbling, a Turkish art), taking pictures and printing them with their instructors. These rooms should also give response to the needs of the activities and the children's sensitivities. The large, flexible good lightened, calming rooms should be used as workshops.

4.2.3.3 Teacher's Room

The teacher's room should provide a relaxing and comfortable environment for the teachers and teaching assistants in their spare times between lessons. 8 m^2 area should be supported for 5 teachers. 1,5 m^2 area should be added into the room for every other teacher. It is desirable that the teacher's room is planned close to classrooms for easier control and decreased travel time. Adequate storage space should also be ensured in these rooms.

4.2.3.4 Administrative Units and Staff

In the school, offices for administrative personnel and other staff like the psychologist, child development specialist or the staff which provide guidance services should be present. These rooms can be minimum 10 m^2 (MEB, 2007) and should provide a welcoming environment for the parents who will discuss their many problems and seek for help, in these rooms. It is also desirable that these rooms are situated close to the entrance hall, to separate the parents from the education spaces which contributes to the concentration of the children during the education process.

4.2.3.5 Infirmary

The extraordinary situations should also be considered in the school specifically designed for the children with autism. Children may become sick, or may have an injury. In the situations that professional medical attention is needed. To create a solution to this issue it is vital to create

infirmary or nurse's area so that different forms of illnesses such as common cold and measles can be accommodated within the school (Cook, 1994).

4.2.3.6 Wet Spaces

For the toilets of the school, the number of toilets and washbasins is calculated to have one toilet and one wash basin for every 20 users. Up to 30 teachers, one toilet and one washbasin can be enough. Furthermore at least one toilet for individuals with physical disabilities should be provided. The urinals are optional for the wet spaces for male users (MEB, 2007). The wet spaces should be planned separately for male and female users, and the hygiene of the space is especially crucial. Good ventilation is very important to avoid odors which may especially disturb hyper-olfactory children.

The wet spaces should be conveniently located, be accessible and safe toilet and hygiene areas which minimize travel distances and loss of curriculum time.

There are two different views about the sizes of toilet appliances. One view claims that the size of the urinals, toilets and washbasins should be age-appropriate to provide easier use. The regulations in UK similarly mention that the toilet appliances should be selected to reflect the age of the pupils. "All levers, handles, dispensers, etc. should be suitable for use, according to the type of need, such as for physical disabilities or for behavior difficulty, as appropriate" (BB 77: DfEE, 2005 Section 4.14.17). Some specialists on the contrary, claim that these appliances should be normal size to reflect the outside world. This way training for the usage of the

toilets can be done in the wet spaces for independence in every-day living skills. However the size of the toilet appliances are, the space and layout of the wet spaces should be suitable for support and supervision by teachers and staff. Clean, healthy and safe environments with appropriate light and color, pleasant ambience and airy atmosphere should be created. Floors and other surfaces should be non-slip, glare-free and easy to clean.

4.2.3.7 Recreation Spaces

4.2.3.7.1 Multi-Purpose Room

The children with autism can benefit from music, drama and movement by using technology, instruments and other tools that enable them to communicate and interact. Self expression and creativity, enhanced self-esteem, self-confidence, and social and interaction skills could be developed with the help of these activities. The school can organize conferences about autism with visiting professionals in this space. It can also be beneficial for the community use. The appropriate use of texture and materials, harmonious setting for supporting the creativity of children should be reflected in the design of the space. Proper acoustical treatment for the multi-purpose room should be ensured. Furthermore adequate backstage area and foyer space should be designed with this program element. The relationship between the multi-purpose room and the main hall should be thought at the beginning. The “Building Bulletin 77 (BB77), Designing for People with Special Educational Needs and Disabilities in Schools”, states the following about the subject:

> It is sensible to place the dining area adjacent to the main hall with acoustic sliding folding door separation. This enables combined use before and after lunch, after-school use and extended and community use at weekends. If sliding folding doors are used to enable a larger multi-purpose space to be formed, these should be of the highest acoustic quality (BB 77: DfEE, 2005 Section: 4.6.5).

4.2.3.7.2 Gymnasium

Physical education is part of the education process for the children with autism. It supports the awareness of body and space, improve activity skills along with social and teamwork skills which would lead to progress of independence, compatibility to the society and inclusion.

When the bad weather conditions makes it difficult for children with autism to play outside, the gymnasium give space for them to spend their energy while they are making progress in their education and sustaining development of the gross motor skills.

Physical therapy takes place in the gymnasium. The gymnasium provides an area for children to burn off excess and nervous energy, develop gross motor skills and coordination, and participate in imaginative play. The play structures should be varied in supporting a wide range of child sizes and abilities.

The gymnasiums in schools for children with autism can be smaller in size than those in mainstream schools because the physical activities are different. The minimum space requirement for a gymnasium is 20 m^2 (MEB, 2007).

The design of the gymnasium should motivate pupils to participate in the activities and offer an energizing healthy atmosphere. The gymnasium in the special schools can be combined with the main hall of the school carefully to form a single multi-functional space. In addition to that gymnasium should include wet spaces. Toilets and changing rooms should be designed according to the needs of children with autism as it is

discussed in detail in the previous section. They should be accessible and positioned similarly close to the external play spaces for ease of access (BB 77: DfEE, 2005 Section 4.7.5). Last but not least, one should pay attention not to compromise the need for a good ambience and acoustic requirements for the sake of the need for durable and impact resistant materials on wall, floor and ceiling finishes.

4.2.3.7.3 Hydrotherapy Pool

Hydrotherapy is increasingly used in the treatment of autism. It is principally used for medical treatment and exercise for these children since movement can be achieved with less physical effort and water has a tranquillizer effect. Especially warm water is efficient medium for promoting muscle relaxation and therapy treatment. Therefore, swimming pools should be an integral part of the schools due to their therapeutic relaxation effect. Gülay Karasu explained that even though they did not possess a swimming pool in their school, they take children to an external pool, and that they would benefit extremely from a pool which is integrated to their own school (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). In different examples the swimming pool is combined with the gymnasium for integrating the physical education program. In addition to the pool, adequate changing rooms and showers should be designed. As it is discussed in the previous sections these places should be well illuminated, ventilated and taken precautions for children not to slip and fall.

According to the UK regulations for special education schools (BB 77), the most appropriate size for space for hydrotherapy is 85 m^2, with a pool of 24 m^2 and a surround of 2–2.5 m wide. Wet changing areas for pupils will be 30 m^2 each for boys and girls separately. Staff changing will be 4 m^2 each

for male and female separately. The areas required for pool plant and pool storage will be about 20 m^2 and 6 m^2 respectively (BB 77: DfEE, 2005 Section 4.10.9).

4.2.3.7.4 Dining Hall

The dining hall provides space for teachers, therapists and students to have lunch on a daily basis. It should create an enjoyable and relaxed atmosphere and support positive attitude for food. Cafeteria is also a place for socializing. They should not be disturbing and cause stress. Some pupils may need assistance during the meal and may need to focus on this activity while they are eating. Therefore, the appropriate space in which the teachers and assistants will help children during meal may be needed. The size of it will depend on whether all the pupils will sit at the same time all together or they would sit for dining in groups. To give an idea about the area of the dining hall, it can be said that 80 m^2 of dining hall would be enough for 96 pupils aged 0-6 or 80 pupils aged 7-15. For children post-15 126 m^2 area would provide a good sized dining hall (BB 77: DfEE, 2005 Table 17). However, it is better to separate the pupils into two according to age; below and above 15.

The seating areas and the acoustics of the dining hall are the important factors that should be designed properly. Tables and chairs can be adjustable according to children's convenience.

If the meal is cooked in the school, the appropriate kitchen along with spaces for the staff should be designed. When the meal is delivered from off-site, there should be enough storage space to preserve the meals. Health and safety requirements should be applied for providing hygiene in

the environment. The ventilation is especially important to not to disturb hyper-olfactory children.

4.2.3.7.5 Library / Toy Library

The library should be designed suitably to support pupils' learning from different sources. The library should be composed of not only books but also different varieties of media. It is common to create an interactive environment which enables pupils to use them. A good library can be 15 to 30 m^2 (BB 77: DFEE, 2005 Section 4.8.2). "A comfortable learning environment with low-glare lighting, good-quality acoustics, thermal comfort and ventilation should be provided." (BB 77: DFEE, 2005 Section 4.8.2). In the library, some publications, informative books and other aiding materials should also be procured for parents to gather information about the disorder and ways to cope with it. Akkök and Sucuoğlu mention that in abroad special schools there are also toy libraries which are very desired in Turkey as well. From this library, toys that can be used for child development can be borrowed. These can also be toys that children simply enjoy playing with.

4.2.3.7.6 Outdoor Spaces

For the therapy of an autistic child, playing in a garden have an important positive effect. Planting flowers, playing with soil, observing and playing with little animals like rabbits or ducks have a tremendous therapeutic effect on children. Some schools provide therapy with horses which is also very helpful. A nice garden may also aid to the improvement of children's social skills. According to Karasu, external play areas such as basketball

court and a sandbox are other elements of these schools to serve the children enjoyable activities which could be integrated to the class hours or leisure time activities. (Personal interview with Karasu, Şahin and Mercan, 04.04.2009) However, this external space should be designed carefully to provide the safety of children by taking into consideration their habits. The outdoor spaces should provide at least 25 m^2 area and 1,5 m^2 of space for each children (MEB, 2007).

4.2.3.8 Extra Curricular Spaces

4.2.3.8.1 Shops integrated to school

The school can shelter some shops where artifacts made by children can be sold and gain profit to the school. Autistic children also can work in these shops as apprentices, and acquire a profession like hairdresser, waiter or a repairer. These shops function separately from school, for outside visitors.

4.2.3.8.2 A Guesthouse integrated to school

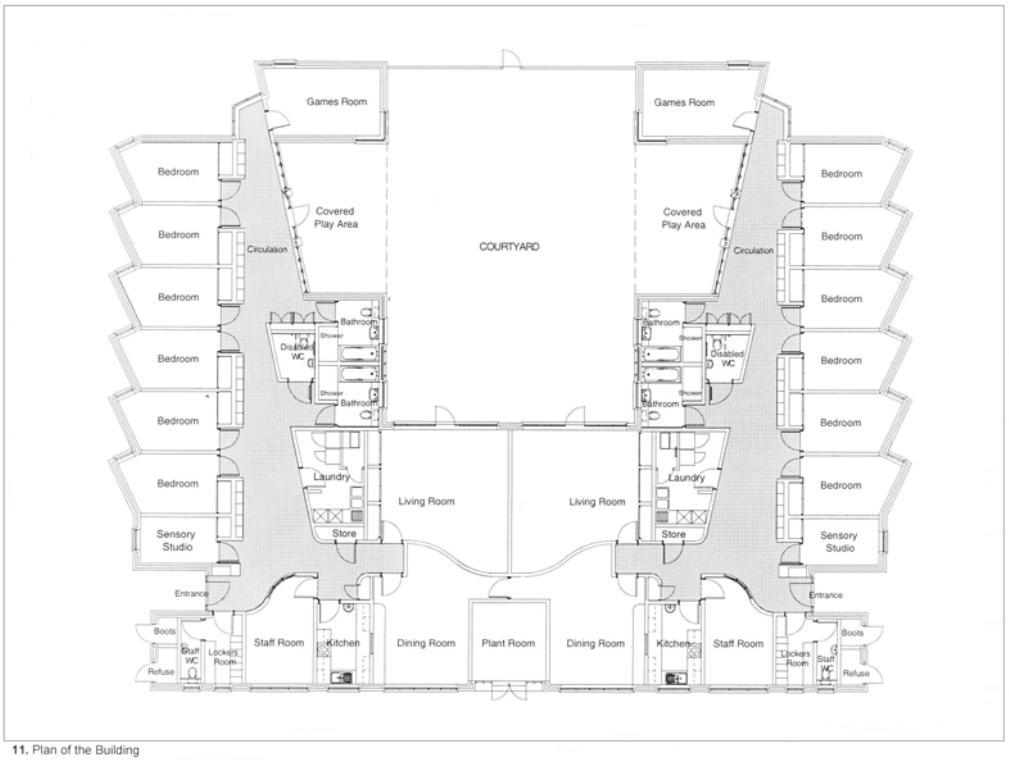
Some families come from close cities for their children to get education. These families have difficulties finding a place to stay in a city they do not know well. Transportation of children back and forth to the school is also a problem. A guesthouse for these families may provide a big help. The design of this guesthouse should be handled like the school itself. Autistic children and their families should feel safe, comforted and calm during their stay. All design features for a special school apply for accommodation of families with autistic children.

4.2.4 Circulation Spaces

The circulation spaces which links spaces together both in horizontal and vertical direction have to be carefully studied for the well being of children and teachers in a special school. They should be pleasant, well lit, practical, convenient, wide-enough and allow for efficient use since transition time from one place to another might corrupt the education process, and distract a child if not carefully designed.

The corridors should not be too narrow nor too wide as it can create an institutional feeling and confuse children. These spaces would also be hard to heat and maintain (BB 77: DfEE, 2005 Section 4.3.3). Enlightened and airy corridors are desired in a school, additionally one should avoid long, narrow and monotonous corridors because it causes for problematic behaviors in children (BB 77: DFEE, 2005 Section 4.3.3).

One good solution is to open up the corridors to larger spaces for social gatherings and spaces for calming or resting. Architect Christopher Beaver questions this conventional corridor system and adopts a more spacious and multi-functional use for the vertical circulation space, in the residential environment he designed for autistic users which the teachers and the residents are very pleased with. The residential unit adopts a corridor system which gradually enlarges to create larger social spaces where high level natural light makes it more pleasant (**Figure 4.13**). This practical circulation space also contains hinged toy or storage boxes. The team leaders in the residential unit reports that “children prefer the circulation space to the lounge for social activities” and that they enjoyed sharing a story time on their beanbags which they bring to the space, before going to bed (Whitehurst, 2006).



11. Plan of the Building

Figure 4.13: residential units for autistic individuals / Christpher Beaver (www.sunfield.org.uk/pdf/Designing_Environments.pdf - Willemsen-Swinkells SHN, accessed on 14.12.2009)

Providing good illumination levels in corridors is crucial since dark corridors are a general mistake which should be avoided especially in the case of a school for children with autism because of their perceptive disabilities. Natural light should be introduced inside where possible with openings in the corridors, clerestory windows, top lighting or any other solutions to improve the quality of the overall design. Clerestory windows can be a good solution for illuminating corridors. By adjusting the roof's layout (or roof break line), natural light can be introduced to the corridors. Below there is an example of corridor illumination through clerestory windows in an institution for autistic adults designed by architect Simon Humphrey (**Figure 4.14**).

Figure 4.14: Clerestory windows in institution for autistic adults / Simon Humphrey (Humphrey, 2008:8)

If the roof system does not allow for openings or the school has more than one floors, windows located on the walls between the corridor and the classroom contribute to the luminance level of a corridor. However lighting levels here should be adjusted by artificial lights or other openings on the corridor to bring natural light inside. The Pistorius School for Disabled Children designed by Behnisch, Behnisch & Partner adopts a similar arrangement (**Figure 4.15**). Here because of the deep plan arrangement, it

was harder to provide natural ventilation and lighting in the center of the building, especially in the therapy pool and in the dining hall. The architects introduced “high level automatically opening clerestory windows” which controls and facilitates natural ventilation and lighting (Dudek, 2008:96). Besides these halls, the corridors are substantially illuminated in the school. Mark Dudek, the writer of the book “Schools and Kindergartens – A Design Manual” (2008) underlines the importance to avoid “deadening institutional feel of the dark airless central circulation corridor”. Light coming from the classrooms helps illuminating the corridor.

Figure 4.15: Pistorius School for Disabled Children / Behnisch, Behnisch & Partner (imagineschooldesign.org , accessed on 22.12.2009)

The vertical circulation cores or elements have equal importance for a well-designed school with multi-stories. Stairs, elevators, ramps offer a learning experience as well for motor coordination. Careful planning of these elements enhance the school design and facilitate its use. Accordingly, these elements should be placed to avoid “congestion, conflict and unnecessary travel and waiting times”, with a good fire strategy plan in mind (BB 77: DfEE, 2005 Section 2.1.5).

Spiral staircases are not very welcomed in these schools. Because children feel the need to hold on to the handrails, they have difficulty in the narrower part of the steps. As a consequently, single flight staircases are

preferred. The risers should be short, as the ones in kindergartens. These children also enjoy squeezing themselves between the railings so the staircase should be designed accordingly (Personal interview with Karasu, Şahin and Mercan, 04.04.2009).

4.2.5 Lighting

Many scientific researches show a direct correlation between an improved lighting design in schools and the performance of students (Plympton et. al, 2000; Heschong Mahone Group, 1999). Efficient lighting also helps energy saving by reducing the waste in energy sources and decreases the money spent on artificial lighting (Al-Mohaisen et al., 7). For a school designed for children with autism, lighting should be more carefully studied considering the tremendous effects of the quality of light on its users. Autistic children may react differently to the intensity of light coming into the building. One who has difficulties in vision might struggle to see properly in a poorly illuminated room, for another one who has greater sensory processing problems, too much glare might disturb his/her eyes so much that it causes fear and great deal of discomfort (Grandin, 2006:62). Also sharp transitions from light to shadow deranges the individuals' suffering from problems with sensory integration and sensory defesiveness (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). In general, an even and optimized daylight distribution will help the children to be more comfortable in an environment.

Mohamed Boubekri, chairman of Practice & Technology Faculty in University of Illinois, School of Architecture suggests that "[sunlight] can be harsh and it can create shadows as well as extreme disparities in luminance levels inside a room. It can also produce visual discomfort and

glare if not controlled properly". In his paper "Lighting Design" (2008), he draws up the types of fenestration systems and their effects on room illumination and he proposes day lighting strategies for schools and kindergartens. In general, according to Boubekri, for a successful day lighting design, the orientation of the school should be along an east-west axis so that the longest façades with the classroom windows face either North or South. The reason is that the North side allows "diffuse daylight", and on the South side it is "relatively easy to control the sunlight in winter and summer" (36). To bring light deeper into the space and obtain an optimized daylight distribution Boubekri suggests fenestration "placed high in the wall such as clerestories or tall side windows". To avoid excessive glare he proposes "bringing daylight from two different directions" and "using indirect day lighting to control sunlight in the classroom" (Boubekri, 2008:36). Different fenestration systems bring different levels of quality of light into the room. One can choose between a "side-lighting system" or a "top-lighting system" or a combination of both.

4.2.5.1 Side-lighting systems

When using side windows, one has to remember that "the light levels are much more intense near the window and decrease rapidly as one moves away from the window" (Boubekri, 2008:36). So the height of the window should be calculated accordingly. Boubekri suggests that large windows allow more light to enter a classroom "but the effective daylight area remains a function of the window height" and in a deep classroom, the light levels will drop on the back of the classroom which creates a gloomy effect. However when using large and high windows, the glare effect experienced near the window area should be avoided (36).

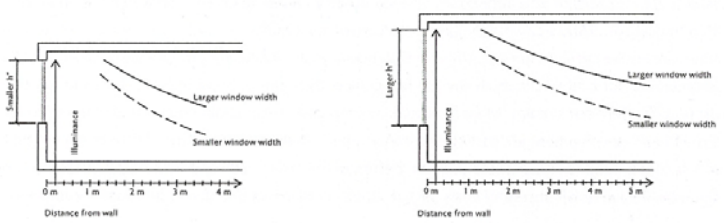


Figure 4.16: Daylight distribution in narrow and large side windows (Boubekri 2008:36)

Clerestory windows might bring a solution for the problem since the light coming from a clerestory window would be more uniformly distributed and it can reach to deeper parts of a classroom. The combination of side windows and clerestory windows is a much desirable solution because it results in “deep and uniform daylight penetration”. (Boubekri, 2008:37). On the first two figures below, the illumination levels in a classroom with clerestory windows is shown, the first with a shorter and the second, longer window height. Following diagram shows a more evenly distributed light in a classroom where a combination of side windows and clerestory windows is used.

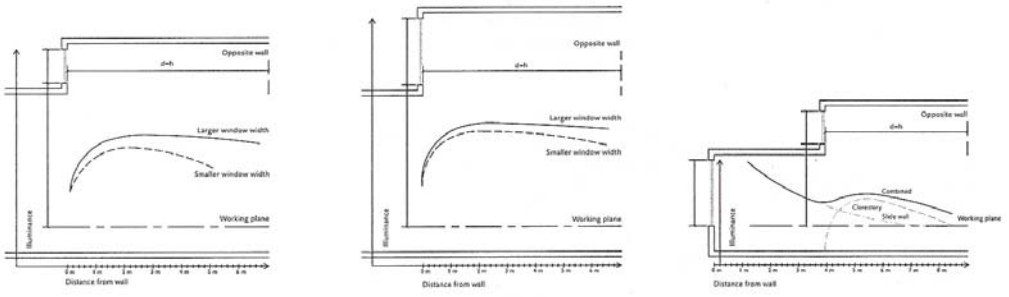


Figure 4.17: Daylight distribution with small and large clerestory window width. Combination of a side window and a clerestory (Boubekri, 2008: 37)

When using side-lighting systems, introducing light shelves to the fenestration units can help to minimize the glare effect near the window and dark areas on the back of the room. Boubekri explains the working principle of a light shelf as follows:

They are designed such that the clerestory portion above the light shelf catches sunlight or diffuses daylight and reflects it toward the back of the room away from the window. The protruding portion of the light shelf, in the case of a combined or exterior light shelf, acts as a shading device and prevents sunlight from falling on the work area immediately adjacent to the window. It also cuts on glare and minimizes brightness near the window. As a result, more uniform light levels are achieved throughout the room. The clerestory portion of the window may be made of clear glass for maximum daylight harvesting. The lower portion below the shelf is referred to as the view window. The glass in it may be tinted to reduce glare.

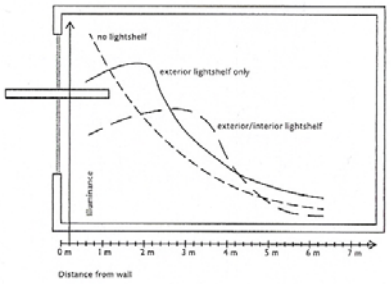


Figure 4.18: Daylight distribution with and without a light shelf (Boubekri, 2008:38)

Clerestory window system is a preferred strategy while designing a place for individuals with autism. Besides its advantage of providing an even natural light to the space, it also blocks the distracting visual stimuli from the outside which helps children to easily concentrate on their educational task. One other advantage is that these high level windows prevent children to escape from an open window. The specialists on autism report this as a major problematic behavior and say that the teachers always have to keep an eye on the children in case that they get harmed (Personal interview with Akkök and Sucuoğlu, 17.11.2009). If side windows are used in a classroom it is important that the window crank is located higher so that children cannot operate them, or the part which opens for ventilation is placed higher in the window area.

There are many examples of special schools which uses clerestory windows as a design tool for a decent environment for education. The architectural firm Haverstock Associates introduces to a special school building they have designed, a Y shaped section beam which enables high level natural light to evenly enter the building from clerestory windows and at the same time provides a solid enclosure to the surrounding, in Stephan Hawkings Special School in London, UK (Dudek, 2008:92-93) (**Figure 4.19, Figure 4.20**).

Figure 4.19: clerestory windows in Stephan Hawkings Special School / Haverstock Associates (www.haverstock.com/pages/educationmainparent.htm accessed on 22.12.2009)

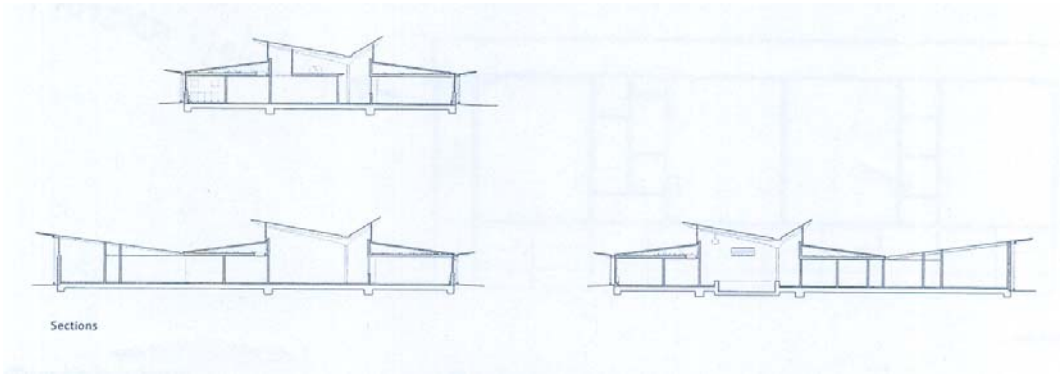


Figure 4.20: Sections showing the Y-section frame, Stephan Hawkings Special School / Haverstock Associates (Dudek, 2008:93)

4.2.5.2 Top-lighting systems

Top-lighting strategies can also be a preferred solution for uniformly lit classrooms in single-storey schools. Skylights, saw tooth systems and roof monitors are various types of a top-lighting system.

For a skylight to be successful, the number of skylights per room, their distance to each other, the height between the skylight and the floor, their size and the height of skylight well should be considered. The light diagram below shows the difference of illumination between a single skylight and double skylight in a room. One can observe that as the number of skylights increases, the light in the room is more balanced and there are less areas that stay in the dark (**Figure 4.21**). This does not mean that unnecessary skylights should be introduced to the room. On the other diagram the space required between skylights for uniform daylight distribution in the classroom, according to the height of the room can be observed (Boubekri, 2008:37).

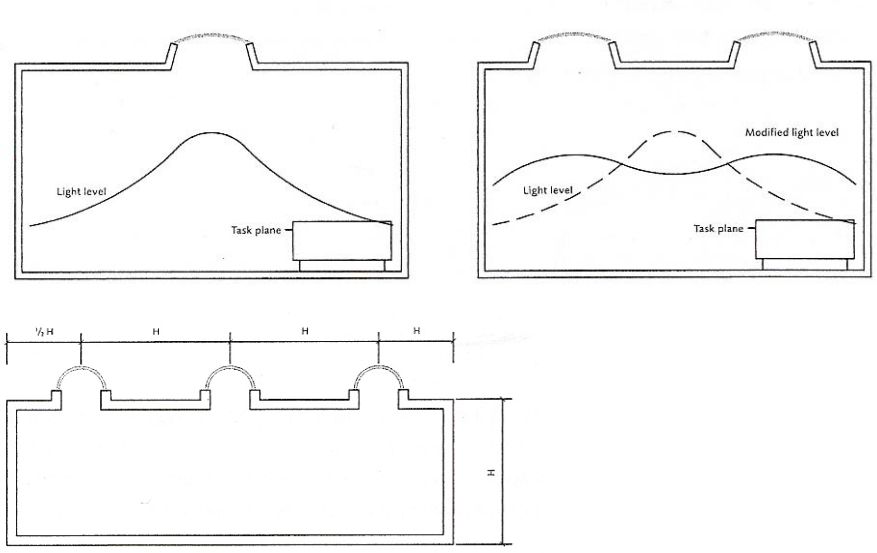


Figure 4.21: Top: Top-lighting with various number of skylights
Bottom: Recommended spacing between skylights for uniform daylight distribution in the classroom (Boubekri, 2008,37)

Another day lighting strategy for an even daylight distribution, is saw tooth systems. These are used especially for large classrooms and workshops. Boubekri states that this system can be more effectual if the openings are facing south. The figure below shows the light levels inside a room which uses saw tooth systems as a strategy for natural lighting. The line marked with number 1, is the daylight distribution on a day of clear sky with the openings of the system facing the sun. The second line represents the daylight distribution with an overcast sky, and the third one, which represents the lowest daylight distribution is on a clear sky but the openings are facing opposite to the sun. One can observe that the light levels rise towards the back of the classroom where maximum light coming from a number of openings concentrate. The second figure shows the necessary opening height and width of a saw tooth window in correlation with the height of the classroom (Boubekri, 2008:38).

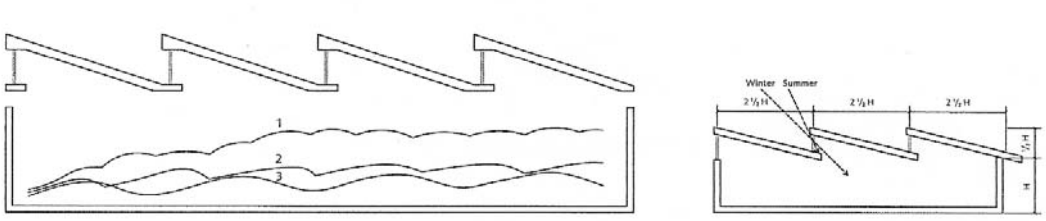


Figure 4.22: From left to right: Generic daylight distribution under a sawtooth system / Recommended spacing between sawteeth (Boubekri, 2008:38)

Roof monitors are also a fitting solution when a uniform daylight is demanded in large classrooms or workshops. The difference from the saw tooth system is that from the roof monitors light come from two opposite directions which maximizes uniform daylight and that it offers more controllable daylight in winter and in summer (Boubekri, 2008:38). Because the sun angle is more perpendicular during summer, the top of the roof monitor blocks the undesired excess of light to enter the room. In winter,

the angled sunlight enters the room from the openings on the side thus allowing the maximum sunlight for a more illuminated environment (**Figure 4.23**).

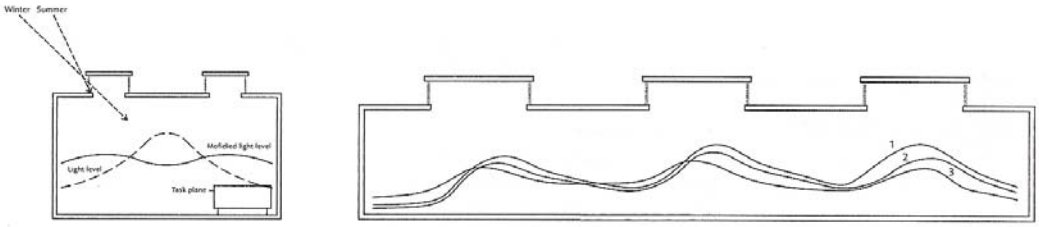


Figure 4.23: Daylight distribution under roof monitors (Boubekri, 2008:39)

In the case of a school for children with autism, consideration should be given for the glass type used in the windows. Sandblasted glass might be preferred in areas where excessive glare occurs. Simon Humphreys suggests the use of translucent glass to diffuse natural light in order to provide “evenness which is less powerful and distracting” (Humphreys, 2008:7) (**Figure 4.24**). One important feature that the windows should possess is that the glass in it should be resistant to impacts. The teachers of children with autism complain about serious accidents happening because of a glass breaking down by an object thrown by the child during a temper tantrum (Personal interview with Karasu, Şahin and Mercan, 04.04.2009; Personal interview with Arslankurt, 07.05.2007).

Figure 4.24: sandblasted glass in special education school for autistic pupils / Greenhill Jenner (Humphreys, 2008:7)

4.2.5.3 Artificial lighting

Needless to say, the natural light would not always suffice. When it comes to artificial light teachers stress the inconvenience of florescent lamps. The children may develop an obsession with the twinkling light or they might enjoy it so much that they ignore everything else in the environment which toughens the education process (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). Temple Grandin also states the disturbing effect of fluorescent lighting on autistic people, saying that some autistic individuals can see the flickering of fluorescent lamps caused by the electricity turning on and off sixty times per second which may result in "seeing a room pulsate on and off". In her book "Thinking in Pictures – My Life with Autism" she quotes the experience Donna Williams, an autistic individual lives with fluorescent lighting:

> Fluorescent lighting in the classroom was a big problem for Donna Williams. Reflections bounced off everything, and the room looked like an animated cartoon. Fluorescent lighting in a kitchen with yellow walls blinded her. There were also situations in which things disappeared and lost their meaning. Donna

> described moving quickly through a hall: “Perceptually the hall did not exist. I saw shapes and colors as it whooshed by.” When her visual system became completely overloaded with stimuli, all meaning in visual sensation was lost. (Grandin, 2006:70)

Other artificial light in classrooms should be lights that can be adjustable upon desire. A rheostat (dimmer) switch for artificial lighting is a preferred solution for many special schools. Systematic education or desensitization to light can be accomplished easier this way. For a child who is over-sensitive to light, the teacher might begin the education with lights dimmed and gradually increase the level of light in the classroom in a manner that would not disturb the child. This way he/she gets used to excessive light step by step, enlarging his/her range of tolerance to the light (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). Natural light should also be flexible and adaptable with the help of different sun shades.

4.2.6 Acoustics

The acoustic treatment is maybe one of the most important features in a school for autistic children. When asked to teachers, the important characteristics that a special school for children with autism should possess, the first thing that comes to mind is acoustic treatment (Personal interview with Karasu, Şahin and Mercan, 04.04.2009).

Consequently, it is not surprising that a questionnaire study with first hand caregivers of autistic children on the impact of architectural design elements on autistic behavior, conducted by architect Magda Mostafa, shows acoustics as one of the two major concerns to be addressed when designing a space for children with autism, along with “spatial sequencing” which will be covered later in this chapter (Mostafa, 2008:193).

Because of these children's oversensitivity to certain sounds, the education milieu can be chaotic if not properly acoustically treated. Temple Grandin tells her fears and disturbances related to sound like the following:

> When I was little, loud noises were also a problem, often feeling like a dentist's drill hitting a nerve. They actually caused pain. I was scared to death of balloons popping, because the sound was like an explosion in my ear. Minor noises that most people can tune out drove me to distraction. When I was in college, my roommate's hair dryer sounded like a jet plane taking off. Some of the sounds that are most disturbing to autistic children are the high-pitched, shrill noises made by electrical drills, blenders, saws, and vacuum cleaners (Grandin, 2006:63).

Grandin also stresses that these children differ from each other in terms of the sounds which cause them great amount of disturbance. While a child may love the sound of a vacuum cleaner and cannot get relieved without, for another one this unbearable sound may cause great fear (Grandin, 2006:63). Psychologist Ferhunde Öktem talks about a patient who has temper tantrums when he hears the sound of "Ezan" (Muslim call to prayer) and another autistic patient who memorizes "Ezan" and repeats it without ceasing (Personal interview with Öktem, 25.09.2009). So in order that these children can coexist in the same institution, acoustic treatment gains priority in the design of the school. Acoustical insulation materials also can serve to the safety of the environment since they also provide a soft surface on the walls.

There are two aspects that has to be taken care of, in acoustical design. One is decreasing the reverberation time in classrooms and other places. The other is providing a soundproofed room with acoustical insulation for the noises coming from outside the classroom. Reverberation is "the persistence of sound in a particular space after the original sound is removed" (Valente et al., 2008:426) "A reverberation, is created when a sound is produced in an enclosed space causing a large number of echoes to build up and then slowly decay as the sound is absorbed by the walls

and air" (Lloyd, 1970:169). Decreasing reverberation time is important because it helps a child to understand speaking better (Personal interview with Sorguç, 03.12.2009). Therefore absorbent materials should be used inside a classroom. These materials should vary from materials absorbing high frequencies like the buzzing of a fluorescent lamp to low frequencies like the noise of a computer. The cladding in a room like carpets, drapes or furniture usually helps to decrease the reverberation time. Additional acoustic panels might be added to the room. Avoiding too much electrical installation is another measure for low reverberation time (Personal interview with Sorguç, 03.12.2009). In large enclosed spaces the reverberation is more disturbing. In these spaces, like ateliers or gymnasium further measures should be taken. Perforated wood panels can be a good solution for the ceilings. Fabrics like velvet are said to be a good absorbent material which can be used inside a space to decrease reverberation time. For acoustical insulation special acoustic panels used to decrease the intensity of external sounds helps to provide a more quiet environment for children.

Architect Magda Mostafa, in the light of the results deduced from the questionnaire study made with care givers of autistic children, conducted a research on how acoustically treated rooms effect the education of children with autism. In this research, she compared the "attention span" (amount of time in seconds the child remains on task without distraction), the "response time" (amount of time in seconds it takes the child to respond to a command or question) and "behavioral temperament" of two groups of autistic children; one being educated in an acoustically treated room and the other in a normal room. Even though the materials for sound-proofing were inexpensive materials which required minimal installation, Mostafa argues that the children who studied in a soundproofed classroom were more likely to respond quickly to commands and questions, to be more

attentive in a study, stay longer that way and have a decrease in their problematic behaviors (Mostafa, 2008:193-195).

The concept of flexibility here plays an important role. Mostafa argues that however beneficial these acoustically treated rooms for the education of autistic children are, one must create a “graduated series of acoustically modified rooms for speech therapy as well as other activities requiring similar acoustical environments.” This is to avoid, she continues, “the ‘greenhouse’ effect, where a child becomes dependant upon the optimum acoustical quality of the room and is unable to function and generalize his skills outside of it” (204). The gradual and systematic desensitization for sound can take place in these variant soundproofed rooms.

> This graduated series would allow the child to use the fully soundproofed room during the critical stage of his autism, when such an intervention may be the only way to initiate communication. Having mastered a fundamental group of communication skills, the child should then be moved to a moderately sound-proofed room where he will begin to develop background noise filtration skills. This should continue through the series of available rooms with the ultimate objective of functioning in as acoustically normal an environment as possible (Mostafa, 2008:204).

4.2.7 Color Scheme

Color theorists Frank Mahnke and Rudolf Mahnke affirm that the color of an environment affects body function as well as mind and emotion (Mahnke and Mahnke, 1987:1-3). Different use of colors evokes different feelings and moods. Therefore it is especially important to pay attention to the color scheme in a special school for children with autism. For such schools specialists suggest warmer hues, skin tones and pastels in order to

reduce tension, nervousness and anxiety[5]. Deborah T. Sharpe, in her book "The Psychology of Color and Design" claims that autistic individuals "respond differently to high and low-saturated colors". However she observes that low saturated colors might work better for cognitive functioning than high saturated colors in an environment. She also adds that there seems to be a "direct relationship between the severity of the disorder and the intensity of the response to the degree of saturation". For people with more severe autism, high saturated colors interfere more with the cognitive functioning (Sharpe, 1975:73). Similarly Temple Grandin (2006) affirms that as a child she was attracted to bright colors, and enjoyed visually stimulating objects. Whereas, she continues, another child with a more severe sensory processing defect might fear and might try to avoid the same sensory stimulants (69). As a consequence it is more preferable to use muted soft colors in classrooms where teachers can introduce additional stimulus for those who need it.

Effective use of color also facilitates orientation and circulation. Color coding of different rooms is a method often used in special schools. It can be helpful for these children to better understand their environment allowing them a commonly lacking sense of orientation. Ultimately color coding might be useful for them to gain the ability to navigate the school independently. Specialists also suggest the use of visual clues for easier orientation. Patterns, colors or abstractions, as well as different landmarks in the school instinctively facilitate the circulation and "communicate to the children, the character of various zones and spaces" (Mostafa, 2008:202).

[5] Theresa Whitehurst cites a research study for the color scheme of Sunfield Special School conducted by Dr Di Pauli (Pauli, Egerton & Carpenter 1999/2000). According to this research some colors can disturb or alter the mood of children, whilst others have a calming effect. As a result of the study, some colors were chosen for the school. These are shades of positive colors like pink and purple for walls and grey for windows, doors, frames and skirting since this non-reflective color contributes to the calmness of the environment (Whitehurst, 9).

4.2.8 Rhythm

The specialists agree on the need for repetition and rhythm for children with autism. Rhythmic arrangements inside and outside can help children to avoid stress by providing them with predictable surroundings that they can easily understand. Gülay Karasu, when asked if a rhythmic façade would be beneficial for a school for children with autism, answers that in the education process they start with things that a child enjoys and build the education system up in relation with these (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). In this sense a rhythmic façade might please children with ASD. However rhythm should be introduced to the building without causing children to withdraw into themselves since it might trigger an obsession. One good example of balance in a rhythmic façade can be found in BSBO De Bloesem School in St. Truiden, Belgium, designed by VBM Architecten. Mark Dudek, the writer of the book “Schools and Kindergartens – A Design Manual” (2008) describes the design as being “in harmony with the fundamental views on how these children will learn best” (91). The major design strategy which deserves appreciation here is the fenestration system which the architects describe as “randomized rhythms”. By tilting the same sized windows, one past another, the architects obtain a certain rhythm on the façade even if the placing of the windows is chosen randomly. Dudek claims that these windows which “either seemingly hanging from the ceiling plane or sitting on the floor plane”, create a “complex visual harmony, (...) fascinating to follow yet totally logical and consistent when viewed from inside” (91) (**Figure 4.25**).

Figure 4.25: “randomized rhythms”, BSBO De Bloesem School, St. Truiden, Belgium / VBM Architecten (www.haverstock.com/pages/educationmainparent.htm accessed on 22.12.2009)

4.2.9 Paving and Coatings

The materials used for paving and coating of the walls, floors and ceilings have much more importance in a school for autistic children than any other school. In general, soft, robust and easy-clean surfaces are preferred. These children may obsess about some materials or because of their lack of ability to processing sensory stimulation they might not perceive the hazards in the environment and might hurt themselves. Information gathered from the interview with the teachers of autistic children shows that some children might be obsessed with paving with a pattern on the floor, start to count them and hold aloof to the outside world. They also warn that roughcast walls can cause extreme pleasure for some children when touched which may result again with getting withdrawn into their own world. Every surface which allows sensory input and gives pleasure to the child can become an obsession which hardens the job for the teachers. Therefore these materials are not preferable in classrooms. Covering should be in a manner that do not trigger an obsession. Absolute rhythmic patterns or tactile stimulants should be avoided (Personal interview with Karasu, Şahin and Mercan, 04.04.2009).

Providing rather soft surfaces is desirable in special schools. However, having said that, one might consider the inconvenience of carpet floors. While carpet might be preferable in other schools because it offers a soft surface and helps the acoustic balance of a room, in special schools it is not very convenient to use them. Children with autism sometimes exhibit problematic behaviors like spitting or urinating therefore the carpet would be much harder to clean in these situations. Consequently antibacterial, easy to clean floor coatings should be favored over carpeting.

The desired effect with color-coding discussed in the previous section can also be attained by the use of different materials throughout the school, both on walls and the floor. A combination of different materials on appropriate spaces can help children to understand their environment and supply visual, tactile or even auditory clues about where they are and how to act in this environment.

The interior design office “design+autism” founded by Kip Farmer an interior designer and father of a child with autism, propose “selecting solid fabrics and floor coverings” to keep the eyes from “fixating on distracting, complex patterns”. Another suggestion from design+autism is to use foam tiles which supply an “impact-friendly, durable surface that also deadens acoustics” (designautism.com).

The use of different materials and absorbent acoustic panels in a classroom helps to provide a less reverberant environment. These materials should be selected according to their sound absorption range with various frequencies. The book “Engineering Principles of Acoustics” written by Douglas D. Reynolds (1981), provides some information about absorption coefficients of some common building materials.

According to this data, floors using a technique consisting of “wood on joists” supply a good absorption in low frequencies (125-500 Hertz). For higher frequencies (1000-4000 Hertz) the best results are obtained with “pitch pine wood blocks”, over marble, terrazzo, concrete, linoleum, asphalt, rubber or cork tile on concrete. The second best solution is shown to be “wood parquet in asphalt on concrete” which offers less absorption than wood on joists and pitch pine wood blocks but provides a better solution than other materials (Reynolds, 1981:623). Draperies and fabric can also help to absorb sounds. Reynolds gives the absorption coefficient

of velour which works best to absorb high frequency sounds (2000-4000 Hertz) (Reynolds, 1981:623). For the coating of the walls many materials and acoustic systems are available[6]. The designer of a special school therefore has to conduct detailed studies with an acoustical expert for each and every space in the school.

4.2.10 Fixtures and Furnishings

About this part the most important concepts to remember are flexibility and these children's obsessions. During the interview the teachers kept saying that one major problem they encounter in their current school was that children continuously played with light switches that are on the corridor. They turned the lights on and off without ceasing or pushed each other around to get to the light switch. In classrooms this is not a problematic behavior they say, because learning to turn the lights on and off is a part of the education process. However in the corridors and common places the light switches should be hidden from view. Similarly power sockets should be hidden from view since they can be dangerous (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). For the lighting of a classroom, a dimmer switch should be provided and fluorescent lights should be avoided.

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[6] Some of the materials with higher absorption coefficients are the following (Reynolds, 1981:620-622):
Sprayed-on cellulose fibers; 1 in. thick on metal lath with air space (depth unspecified)
Sprayed-on cellulose fibers; 1 in. thick on solid backing
Compressed urethane foam
Owen-Corning Fiberglass industrial insulation board
Owen-Corning Fiberglass cloth faced ceiling board
¼ in. pegboard – ¼ in. holes on 1 in. centers both ways; 4 in. thick OCF TIW insulation board
Suspended ceiling absorbers with porous material are also helpful to absorb sounds, especially in high frequencies.

The red light of camera systems might cause an obsession with some children and makes it difficult for them to concentrate on the lesson. Therefore the place of cameras should be designed as well. As for the air conditioners, the small sound they make when they start running might disturb children. The teachers do not prefer to use ventilators either because of the fascination of these children to turning objects (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). Accordingly the ventilation system also has to be studied with great detail. Natural ventilation should be supplied where possible.

It was interesting to hear not only teachers working in a school which use radiators for heating but also teachers working in a school with under-floor heating complain about these systems. The radiators might be inconvenient because some children fixate on their adjusting pinion and turn them continuously or they stumble upon the radiators and hurt themselves. A school which uses under-floor heating is very hard to warm up. Consequently teachers complain about how cold it is inside the school, for education (Personal interview with Karasu, Şahin and Mercan, 04.04.2009; Personal interview with Onur, 01.12.2009). A mixture of both systems can be a convenient solution. Radiators can be placed higher in the room. It is important to use radiators that are smooth, without convector fins, easy to clean, accessible and robust to minimize the collection of dust and corruption hazards (BB 77: DfEE, 2005 Table 24). Under-floor heating systems can provide additional heat for rooms but is not enough if used unaccompanied. The warm-up time of these systems can also be longer as compared with radiators. Fan convectors, for reasons of hygiene along with problematic background noise and radiant ceiling panels for reasons of unbalanced heating supply are not preferable in schools (BB 77: DfEE, 2005 Table 24).

For the glare control, curtains or blinds can be used in the side window areas and roof lights. It is important that these features allow a variety of different lighting conditions for different children and do not interfere with the ventilation and lighting supply of the windows. These materials should be easy to clean or laundered on a time basis in order to prevent dust collection. Curtains can introduce color and acoustic aid to a room. Blinds also supply a lighting control but it is essential to remember that “slatted blinds may give sharp contrasts of light and shade” which may create a “strobe effect” for some pupils (BB 77: DfEE, 2005: Section 5.1.4). Additionally some children enjoy playing with blinds which may result in safety or management problems (Personal interview with Karasu, Şahin and Mercan, 04.04.2009).

As for the furnishing, the concept of flexibility is very important. Teachers look for furniture that are easy to move around and a space easily adaptable according to the context of that lesson. They prefer cupboards with covers because children mingle with what’s inside. In play areas however shelving units also should be supplied because it is desirable for children to choose the toy they want to play and be able to pick it up from the storage unit (Personal interview with Karasu, Şahin and Mercan, 04.04.2009; Personal interview with Onur, 01.12.2009). The furnishing should also be robust, easy to clean and adjustable according to child’s height.

In general, it is not expected to decide the type of furnishing which will be used in the school, from the architect. However, having a general idea about these furnishing elements affect the design process positively. Sufficient space should be provided in classrooms and other learning environments to allow flexibility, the negative impacts of a room should be investigated keeping in mind the requirements of certain furnishing and

fixtures. This require intense discussions with the school staff allowing them to visualize the learning space with detailed drawings and examples.

4.3 Checklist

The design guidelines for a school for autistic children have been examined in this chapter. These design issues which are important for special education schools such as planning of the school and program elements, acoustics, lighting, color scheme and rhythm in the school, will be given as a checklist in this section (**Table 1**). The detailing of the school in coating and paving and the type of furniture and fixtures that have to be used in special education schools for autistic children will also be summarized in the checklist. The checklist is composed of necessary guidelines which apply for all schools and those that are crucial for special education schools for autistic children.

Table 1: Checklist

NAME AND DESCRIPTION / DIMENSIONS	CHARACTERISTICS	
	Relevant for all schools	**Crucial for schools for autistic children**
1 SITE SELECTION	• Easy approach and accessibility • Site where social activities take place in the surroundings • No place where alcohol is served near the building (MEB) • Large site if possible for extra curricular activities (like gardens, sports areas, pools, interaction with animals etc.)	• Share space with mainstream school if possible
2 GENERAL PLANNING • Ceiling height minimum 2,50 m from the floor to the beam • overall height minimum 3 meters • If not possible 7 m^3 of space for each student	• Simple, accessible, clear layout • Easy way finding	• Separate entrances for different age and ability groups • Organization of low and high stimulus spaces: Sensory zoning • Single storey if possible

Table 1 (continued)

3 PROGRAM ELEMENTS	• Education Spaces
	  ○ Workshops
	  ○ Music room
	  ○ Computer/Listening Station
	  ○ Crisis room (Early Childhood and Relaxation Room)
	• Recreation Spaces
	  ○ Multi purpose room
	  ○ Conference hall
	  ○ Gymnasium
	  ○ Pool
	  ○ Dining hall
	  ○ Library
	• Infirmary
	• Teachers room
	• Administrative units
	• Wet spaces
	• Outdoor spaces
		• Education Spaces
		  ○ Individual therapy room
		  ○ Group therapy room
		  ○ Swing/Sensory Room
		  ○ Speech Language Pathology Room
		  ○ Occupational Therapy
		• Psychologist and Guidance Staff Rooms
		• Extra Curricular Spaces
		  ○ Shops Integrated to School
		  ○ Guesthouse Integrated to School

3.1 Entrance Hall	• Bright, open and welcoming environment for children, parents and staff • Information desk	• Space for parents to sit and wait for their children • Monitors for parents to watch their children undergoing therapy sessions, in schools with closed circuit camera system • Small playground for siblings • Separate room for breastfeeding or changing diapers

Table 1 (continued)

3.2 Education Spaces	• Safe, simple yet flexible education environment • Different sizes and functions of classrooms • Controlled access to outdoor space is desirable • Appropriate storage units • Appropriate lighting, acoustics, ventilation	• Flexibility, adaptability especially crucial • Spatial sequencing: compartmentalization of classroom space according to different activities • Enough space to enable spatial sequencing • Preparation space before entering the room • Withdrawal space • Observation facilities for families (adjacent rooms with one way mirror/closed circuit camera systems)
3.2.1 Individual therapy One-on-one therapy between teacher and child • Minimum 6 m^2		• Washbasins if needed
3.2.2 Group therapy One or two teachers with a group of maximum 4 children • Minimum 15 m^2 • Minimum 2.5 m^2 of space for each children		• Washbasins if needed

Table 1 (continued)

3.2.3 Early Childhood and Relaxation Room / Crisis Room • Minimum 6 m^2	• Acoustical insulation especially crucial • Calm, safe environment • 1.5 m from the ground, of all wall surfaces covered with soft foam rubber. the floor covering soft and plain color carpet	
3.2.4 Swing/Sensory rooms Sensory environment to enhance and balance children's sensory systems / reward or relaxation • White rooms • Dark rooms, daylight excluded, support light-stimulation work • Either one large 'white room' of 24 m^2 • or two small rooms of 12 m^2 for separate 'white' and dark rooms		• Swings, Light play, Mirror balls, bubble tubes, mirrors, fiber optics, Tactile materials, Cushions beanbags, Squeeze chairs or squeeze machines • Structure for hanging swings • Acoustic proofing • A firm floor, with safe, soft floor finish, usually carpet or foam-backed sheet flooring
3.2.5 Music Therapy Room • Minimum 15 m^2 • Minimum 2.5 m^2 of space for each children	• Storage for musical equipment • Enough space for a group of children and large musical instruments • Acoustical insulation • Materials that decrease reverberation	

Table 1 (continued)

3.2.6 Computer and Listening Station • 15 m^2	• Computers, audio-video equipment • Acoustical insulation to decrease reverberation from computer fans	
3.2.7 Speech Language Pathology room • Minimum 6 m^2		• Acoustical insulation especially crucial • Mirrors for articulation studies
3.2.8 Occupational Therapy • Minimum 15 m^2		• Arrangements to stimulate different places in a child's life ○ Demonstration kitchen ○ Demonstration living room ○ Doctor's office simulation ○ Market, grocery simulation etc. • Washbasins
3.2.9 Workshops	• Large • Flexible • Good levels of illumination and ventilation • Washbasins • Storage units • Large tables, working area	
3.3 Teacher's Room • 8 m^2 for 5 teachers • For more than 5 teachers 1,5 m^2 to be added for each teacher	• Proximity to classrooms for easier control • Adequate storage space	

Table 1 (continued)

3.4 Administrative Units and Staff • Minimum 10 m^2	• Room for founder or his/her representative • Room for Director	• Room for psychologist of the school • Guidance rooms • Room for Child development specialist • Psychologist and guidance rooms close to entrance hall
3.5 Infirmary	• Hygiene • Calmness of the environment	
3.6 Wet Spaces • one toilet and one wash basin for every 20 users. • Up to 30 teachers one toilet and one wash basin • Minimum one toilet for individuals with physical disabilities	• Urinals optional • Separate wet spaces for male and female users • Hygiene • Good levels of ventilation • Easy-use • Easily accessible to minimize travel distances and loss of curriculum time • floor and other surfaces glare-free, non-slip and easy to clean	• Two different theories about the size of toilet appliances ○ Size of toilets, urinals, washbasins to reflect the age of pupils ○ Normal size appliances for training for the outside world. • Ventilation especially crucial for hyper-olfactory children • Space and layout suitable for support and supervision by staff
3.7 Recreation Spaces	• Multi Purpose room • Gymnasium • Dining Hall • Library / Toy Library • Outdoor Spaces	• Hydrotherapy Pool
3.7.1 Multi Purpose room	• Acoustical treatment • Adequate backstage area • Adequate foyer space	

Table 1 (continued)

3.7.2 Gymnasium • Minimum 20 m^2	• Acoustical treatment to avoid echoes • Durable, impact resistant materials • Good levels of illumination and ventilation • Easy accessible changing rooms • Changing rooms also accessible from outdoor sports area • Hygiene in changing rooms	• Need relatively smaller area for motor training than those in mainstream schools • Relatively softer materials for floor finishes to avoid injuries
3.7.3 Hydrotherapy Pool • 85 m^2 area with a pool of 24 m^2 and a surround of 2–2.5 m wide • Wet changing areas for pupils 30 m^2 each for boys and girls separately • Staff changing 4 m^2 each for male and female separately pool plant 20 m^2, pool storage 6 m^2	• Hygiene • Non slip materials • Good levels of illumination and ventilation	
3.7.4 Dining Hall • 80 m^2 area enough for: ○ 96 pupils aged 0-6; ○ 80 pupils aged 7-15 • 126 m^2 area for pupils post-15	• Acoustical treatment • Hygiene • Proper size kitchen and storage space • Ventilation especially crucial	• Adequate space for teachers and staff to assist children in eating

Table 1 (continued)

3.7.5 Library / Toy Library • 15-30 m^2	• Good levels of illumination • Low-glare lighting • Acoustical treatment	• Service for both parents and children
3.7.6 Outdoor Spaces • 1,5 m^2 of space for each children • Minimum 25 m^2	• Safe, controllable • Enough area for ○ Planting ○ Pets ○ Sandbox ○ Playcourt ○ Basketball court etc.	• Relatively soft materials for paving to avoid injuries
3.8. Extra Curricular Areas		• Shops integrated to school • Guesthouse integrated to school
3.8.1 Shops Integrated to School		• Function separately from school, for outside visitors
3.8.2 Guesthouse Integrated to School		• All design features for a special school apply for accommodation of families with autistic children

Table 1 (continued)

4 CIRCULATION SPACES	• Avoid long, narrow, monotonous corridors
	• Good levels of illumination and ventilation
	  ○ openings in corridor for natural light and ventilation
	  ○ clerestory windows on walls between classroom and corridor
	  ○ top lighting systems
	• Vertical circulation cores designed to avoid congestion, conflict and unnecessary travel and waiting time
	• Short risers for staircases
		• Avoid spiral staircases
		• Single flight staircases preferable
		• Railings of staircases designed so that children do not squeeze themselves between them

5 LIGHTING
• For a classroom or an education environment, window area minimum 12% of a classroom's floor area
• The illumination levels in the school
  ○ 100 Lux in pre-school education institutes,
  ○ 250 Lux in classrooms
  ○ 150 Lux in corridors and other common spaces
	• Even and optimized daylight distribution
	• East-west orientation
	  ○ North facade allows diffuse daylight
	  ○ South façade, relatively easy to control the sunlight in winter and summer
	• Fenestration placed high in the wall
	• Daylight from two different directions
	• Indirect daylighting to control sunlight
	• Side lighting systems
	• Top lighting systems
	• Combination of both
	• Light shelves ,sun shades, blinds, curtains to control glare
		• Flexibility of light especially crucial
		• Clerestory windows or top lighting where necessary, for even daylight distribution and avoid concentration difficulties and problematic behavior
		• Sandblasted glass to avoid glare
		• Glass, resistant to impacts
		• Window crank not accessible for children
		• Artificial lighting
		• Avoid fluorescent lamps
		• Dimmer switch for flexibility of light

Table 1 (continued)

6 ACOUSTICS	• Decrease reverberation • Different sound absorbing materials for walls, floor and ceiling finishes according to different frequencies of sound • Soundproofed education spaces with acoustical insulation	• A graduated series of acoustically modified rooms
7 COLOR SCHEME	• Color coding for easy orientation and way-finding	• Warmer hues, skin tones, pastels • Low saturated colors • Additional color and visual stimulus to be introduced later in the room for the hypo-visual children
8 RHYTHM		• Pleasant rhythms that do not cause obsessions • Rhythmic balance
9 PAVING AND COATING	• Soft, durable, easy clean hygienic, impact-friendly materials • Different acoustic materials to decrease reverberation in different frequencies	• Avoid complex patterns • Avoid carpet flooring • Avoid tactile stimulants like roughcast walls

Table 1 (continued)

10 FIXTURES / FURNISHINGS	• Power sockets hidden from view • Mixture of radiators and under-floor heating if possible, if not, radiators desirable for heating • Avoid fan convectors and radiant ceiling panels for heating • Door width minimum 90 cm • If the width wider than 140 cm, doors with double wings.	• Doors of classrooms to open into the corridor. • Otherwise sliding doors to be used. • In the case of a double loaded corridor, door openings not to be placed opposite to each other. • Observation mirrors on classrooms doors (not necessary if the school is using a camera system) • Light switches hidden from view in corridors and common spaces • Any electrical appliances which might cause obsessions to be hidden from view (e.g. Red light of camera systems, fans, air conditioners etc.) • Radiators placed higher on the wall for safety reasons • Furniture easy to move, for flexibility of space • Durable, easy clean, appropriate sized furnishing

CHAPTER 5

DESIGN FOR PRIVATE İLGİ SPECIAL EDUCATION SCHOOL

İlgi Protection of Autistic Children Foundation contacted the author of this thesis in 2007 to design a school building for the education of autistic children, on a site in Dikmen-Ankara which has been a donation by Ankara Governorship. The first sketches were made with architect Kadri Atabaş who also agreed on designing the project free of charge. In 2007, while designing the building, a little information about the nature of autistic children was known by the author. However thanks to intensive discussions with the foundation's administration about the needs of children with autism, their parents and teachers, a general design layout has been composed. The application drawings were made by Atabaş Architecture office. In this chapter the first sketches will be mentioned along with circumstances which affected the design decisions under the section "Preliminary Design". After learning more about autism and the necessary design guidelines for the autistic children, some further suggestions for the building have been made by the author. These will be covered in the second section entitled "Revised Design".

5.1 Preliminary Design for Private İlgi Special Education School

5.1.1 The Site

The site donated by the Governorship is situated in Dikmen, Huzur district where there are mostly residential units in the surroundings (**Figure 5.1**). Two roads surround the site from west and north, the former being a wider 10m road and the latter 7m secondary road. The 3828 m^2 site allows for 4593,6 m^2 of construction ("emsal": 1.20 [7]) and a height maximum of 15.50 m. The slope of the site is very steep having a 16 meter height in 68 meters (approximately 23.5%) (Çankaya Municipality, cadastral extract).

One major element which affected the design process was the site reserved for a playground, adjacent to the school site on the south (shown with blue lines on **Figure 5.1**). Accessibility to the playground area was required, considering this as an advantage for the school design.

[7] Emsal: ratio of footprint area of a building to the surface area of the site

Figure 5.1: The place of the site in the city, Google Earth
Red lines: site / Blue lines: playground site

5.1.2 Program

The program required was consisted of four main education units classified according to age and level of abilities. Additionally the administration unit, social facilities like conference and exhibition hall, gymnasium, cafeterias, a hydrotherapy pool and additional facilities like shops, where children can work and sell handicrafts they make, a guesthouse for families coming from other towns for the education of their children to stay and places for the education and relaxation for families were to be added into the school building. The classification of the education units is as follows:

Unit A: This unit is for children between the age 0-6, who are diagnosed as autistic. The purpose of this unit is to educate these children to minimize their autistic behaviors and to enable their normal development.

Unit B: This unit is for children between the age of 7 and 15, who are attending a normal school. The purpose of this unit is to make progress in the academic life of these children with supportive programs.

Unit C: This unit is also for children between the age of 7 and 15. However, these children have more severe disabilities and cannot attend a normal school. The purpose of this unit is to educate these children and teach them to gain skills in the fields of daily life, manual training and functional abilities.

Unit D: This unit is for autistic individuals who are older than 15 years of age. The purpose of the unit is to educate them to be less dependent on their families and become more productive individuals.

Requested Program

Unit A

10 Individual Education Classes (9 m^2)

6 Group Education Classes (15 m^2)

2 Family Training and Guidance Rooms (9 m^2)

1 Room for the responsible person of the unit (9 m^2)

1 Material Room (9 m^2)

1 Waiting Area for Families (25 m^2)

1 Supervising Room (16 m^2)

1 Teachers Room (20 m^2)

1 Multi-Purpose Room for sports and activities (25 m^2)

Toilets

Unit B

7 Individual Education Classes (9 m^2)

4 Group Education Classes (15 m^2)

1 Family Training and Guidance Rooms (9 m^2)

1 Room for the responsible person of the unit (9 m^2)

1 Material Room (9 m^2)

1 Waiting Area for Families (25 m^2)

1 Supervising Room (16 m^2)

1 Teachers Room (20 m^2)

Toilets

Unit C

5 Individual Education Classes (9 m^2)

4 Group Education Classes (15 m^2)

1 Family Training and Guidance Rooms (9 m^2)

1 Room for the responsible person of the unit (9 m^2)

1 Material Room (9 m^2)

1 Waiting Area for Families (25 m^2)

1 Supervising Room (16 m^2)

1 Teachers Room (20 m^2)

2 Multi-Purpose Room for sports and activities (25 m^2)

1 Time-Out / Crisis Room (12 m^2)

Toilets

Unit D

2 Individual Education Classes ($9\ m^2$)

3 Group Education Classes ($15\ m^2$)

1 Family Training and Guidance Rooms ($9\ m^2$)

1 Room for the responsible person of the unit ($9\ m^2$)

1 Material Room ($9\ m^2$)

1 Waiting Area for Families ($25\ m^2$)

1 Supervising Room ($16\ m^2$)

1 Teachers Room ($20\ m^2$)

2 Multi-Purpose Room for sports and activities ($25\ m^2$)

1 Time-Out / Crisis Room ($12\ m^2$)

4 Ateliers ($15\ m^2$)

Toilets

Auxiliary Units

1 Chairman Room ($20\ m^2$)

1 General meeting room ($20\ m^2$)

1 Director's Room ($16\ m^2$)

1 Deputy manager room ($12\ m^2$)

2 secretary rooms ($9\ m^2$ each)

1 Meeting room ($20\ m^2$)

1 Archive ($9\ m^2$)

1 Canteen ($12\ m^2$)

1 Kitchen ($12\ m^2$)

Cafeteria

Gymnasium

Social Facilities

Conference Hall (for 100 people)

Exhibition Space

4-5 Guestrooms

Additional Facilities

Rentable shops

Synthetic pitch area for soccer

Swimming pool

Playground

Despite this dense program, a major concern was money scarcity while starting the design. The main concern of the administration was that they did not have enough money to finish the construction, so they intended to build the school in two or three stages. However, this did not seem feasible because of the intensity of the program and the site being small and too sloppy. Later on, some sponsors were found and some children's fathers who had construction companies agreed on contributing to the construction materials. As a result this became a minor issue. However, there was still

too little money and the design should have been before all else, economic. Consequently, the construction of the pool and the guesthouse was cancelled.

5.1.3 Site Planning and Spatial Disposition

The site had a 23.5 % of slope (16 meter height in 68 meters) in the cadastral extract given from the municipality. However, in the actual site this slope seemed higher because the left-over earth from the excavations of neighbor buildings were dumped here. This excess of soil was mostly on the east part of the site. Architect Kadri Atabaş was concerned that excavating this earth would be very expensive, so the building was positioned on the west side of the site. Another reason to move the building to west is that, this way the shops could have been placed closer to the main road, thus allowing the pedestrians to notice and use them more frequently. The other advantage of the positioning of the building was the space gained between the school and the neighboring apartments. A buffer zone between these two was beneficial for both. For the time being, the school administration is willing to use that space as a gathering place for parents while waiting for their children during their education (Personal interview with Arslankurt, 07.05.2007).

Another request for the design of the school was to separate the four educational units from each other. The social facilities could have been used commonly by all children. Apart from this, the entrance for the children post-15 (Unit D) had to be separated from the main entrance. Nejla Arslankurt, director of the school explained this request by saying that these children had more severe autistic symptoms and the parents of younger children get demoralized and scared when they see them. There is also the danger of these kids hurting their younger peers involuntarily because they might not always be self-conscious. Additionally, their

activities and education systems are different from other children. They work more in groups, in the ateliers. Apart from the main entrance and the entrance for Unit D, a separate entrance was needed for shops to function independently and a service and car park entrance.

The form of the building was chosen to be a square with an open courtyard in the middle. The four arms surrounding the courtyard are organized on different levels with various heights so that when viewed from a certain point, the façade would not look too high or overwhelming. The enclosed courtyard enables an intimate and easily controllable space for open-air activities. Children can play, grow flowers and vegetables in the garden or play with pet animals without the danger of vehicles passing by the street nearby. By lifting up one arm of the building for one floor height on the south façade, a passage is provided for the children's playground which will be constructed adjacent to the site, on the same level of the courtyard. Additionally, given the smallness and slope of the site, this form enables more natural light for the building. In the design, making the lower floors more transparent and welcoming and the upper floors more solid and controllable was given priority.

Figure 5.2: Perspective Study showing the Preliminary Design

5.1.4 Accesses and Circulation

Because the site was small and the program was dense, the building could not be solved on single storey. Nevertheless the slope of the site, however compelling it was for the design of the building, facilitated the circulation system by providing different entrances on different levels. This system decreased the number of staircases and provided an easier circulation scheme. The main entrance was from a point approximately on the middle of north edge of the site. If we consider this point to be the level ±0.00, the separate entrance for Unit D is at level +8.00, while the shops are situated on level -5.00.

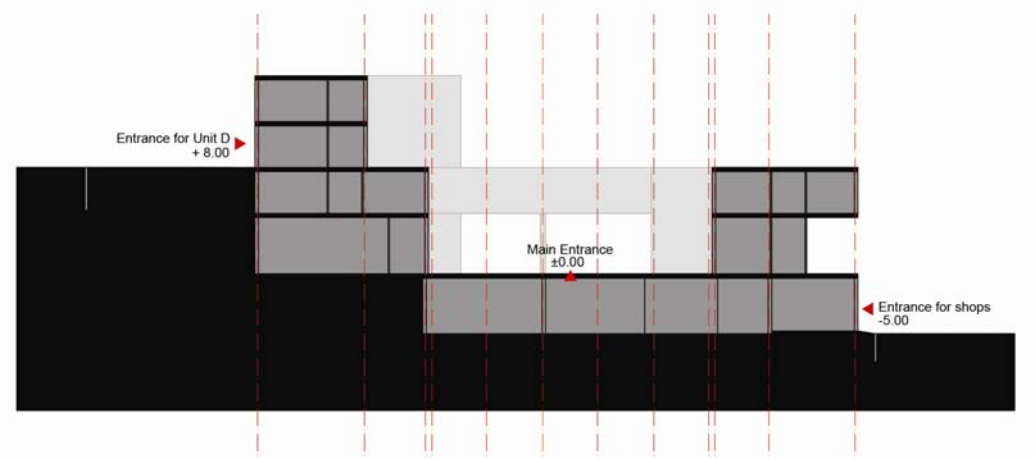

Figure 5.3: section sketch showing different entrance levels

The vertical circulation is made by two cores, which contain staircases that are also used as fire escape staircases and two elevators on each core. These vertical circulation cores are placed on two opposite corners of the building. The classes are placed on two sides of a two meters wide corridor. On some occasions one side of the corridor is emptied, forming terraces to gain more natural light inside and to decrease the massiveness of the building. The space reserved for the classes are four meters wide, providing a rather spacious classroom for different activities. For the

section which includes the conference hall, ateliers and the cafeteria, this range increases to five meters.

5.1.5 Layout

On the ground floor (**Figure 5.4**), the main entrance area, information desk, a conference and exhibition hall for 100 people, a dining hall for children and a small cafe for parents are placed. The walls between the conference hall and the dining hall are thought to be flexible, so that in case of a larger event the space can be enlarged at will. On the ground floor, there are also computer rooms where parents can watch their children during their education sessions. They can sit and wait in the cafeteria or in the terrace, which is placed just next to it. On the ground floor the entrance hall, the dining hall and the conference hall are in a close relationship to the courtyard. On nice weathers this gives an opportunity to relax, play, sit or eat in open-air. The administrative units were first placed in this floor. However, Mrs. Arslankurt requested some of the units to be on the upper floors. This way it was easier for the administrators to control and interact with the students.

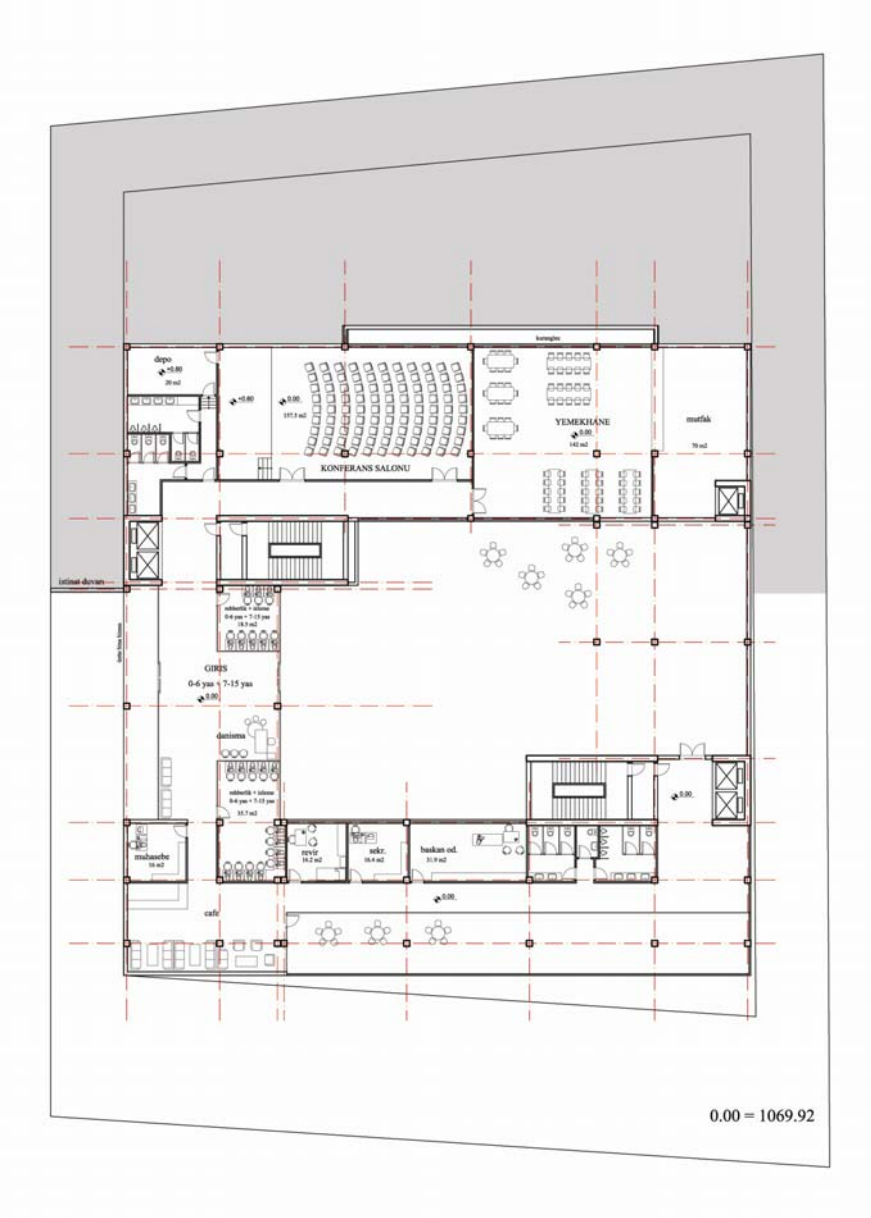

Figure 5.4: Ground Floor Plan / Preliminary design for Private İlgi Special Education School

On the basement floor (**Figure 5.5**) in order not to make too much excavation, 2/3 part of the building is used. Here there is a gymnasium, a car park, kitchen for the cafeteria and other mechanical volumes. Director Nejla Arslankurt insisted on preparing the children's meal in the school itself instead of buying from food companies. Consequently a large kitchen area was reserved in the basement. Prepared food was carried through

service elevators. The shops are also situated on this level; however they are not connected to the school. Their entrances are from the main road, and they function independently.

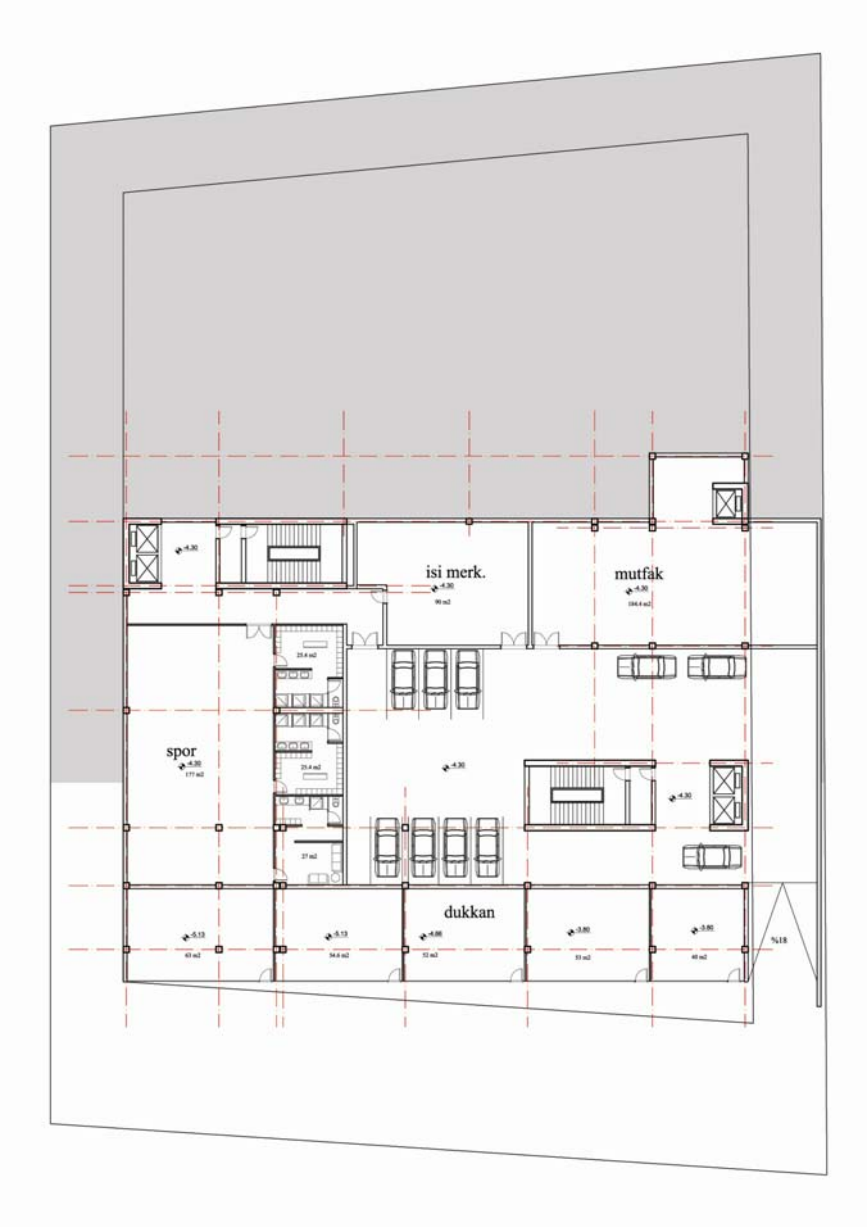

Figure 5.5: Basement Floor Plan / Preliminary design for Private İlgi Special Education School

On the first floor (**Figure 5.6**) there are two units: Unit A (age 0-6) and Unit C (age 7-15, more severe disabilities).

These units are placed closer to the main entrance because it is more difficult to control and guide these children. This way they had to cover a shorter distance to their classrooms. On this floor, ateliers of children post-15 are also situated. These have a separate entrance so that Unit D students do not get together with other children.

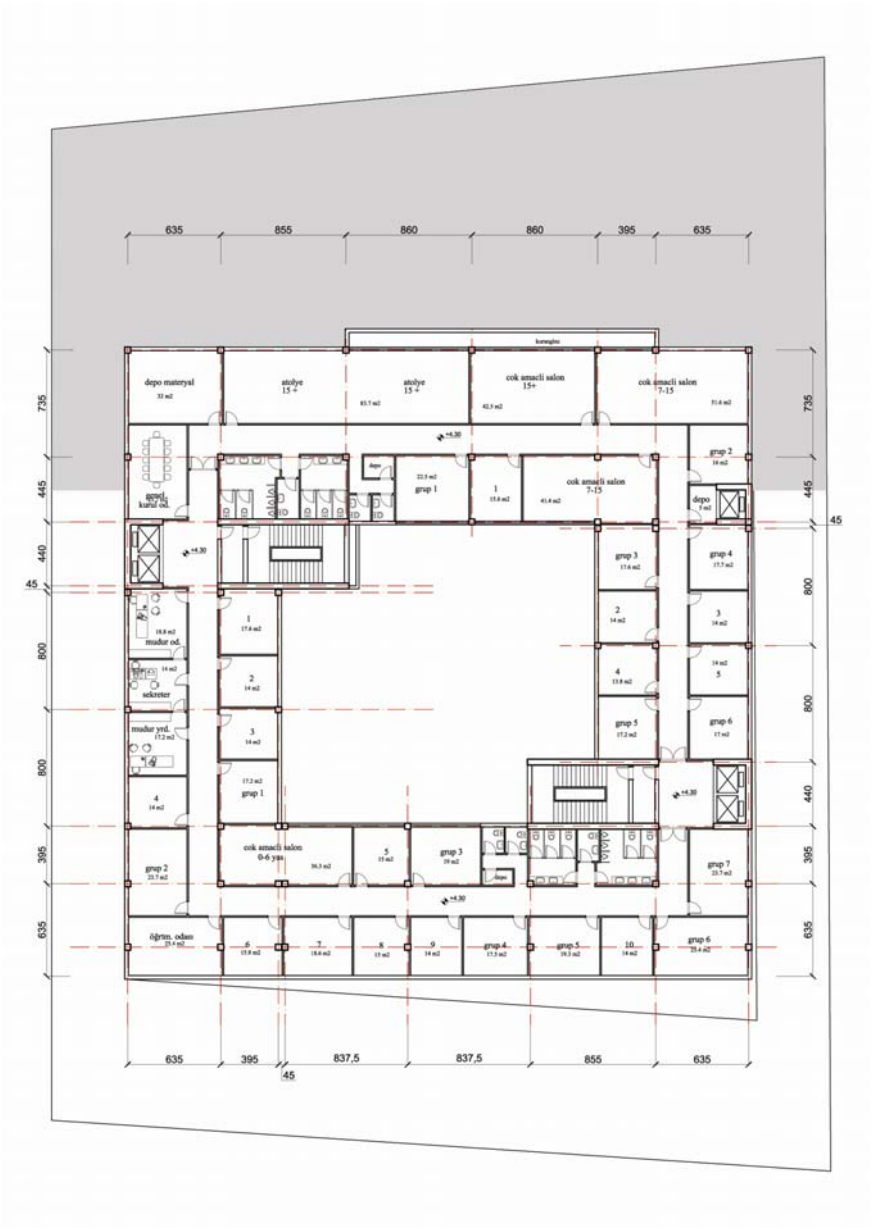

Figure 5.6: First Floor Plan / Preliminary design for Private İlgi Special Education School

On the second floor (**Figure 5.7**), again in different arms, there are the Units B (age 7-15, supportive program) and D (post-15). These have separate entrances; Unit D has a private garden thanks to the difference in elevation. There is also a separate cafeteria for these children so that they do not meet with other students in any condition. Waiting, monitoring and guidance areas for the parents are also separate. The arm where Unit D is placed goes up one more floor where the classrooms are located (**Figure 5.8**).

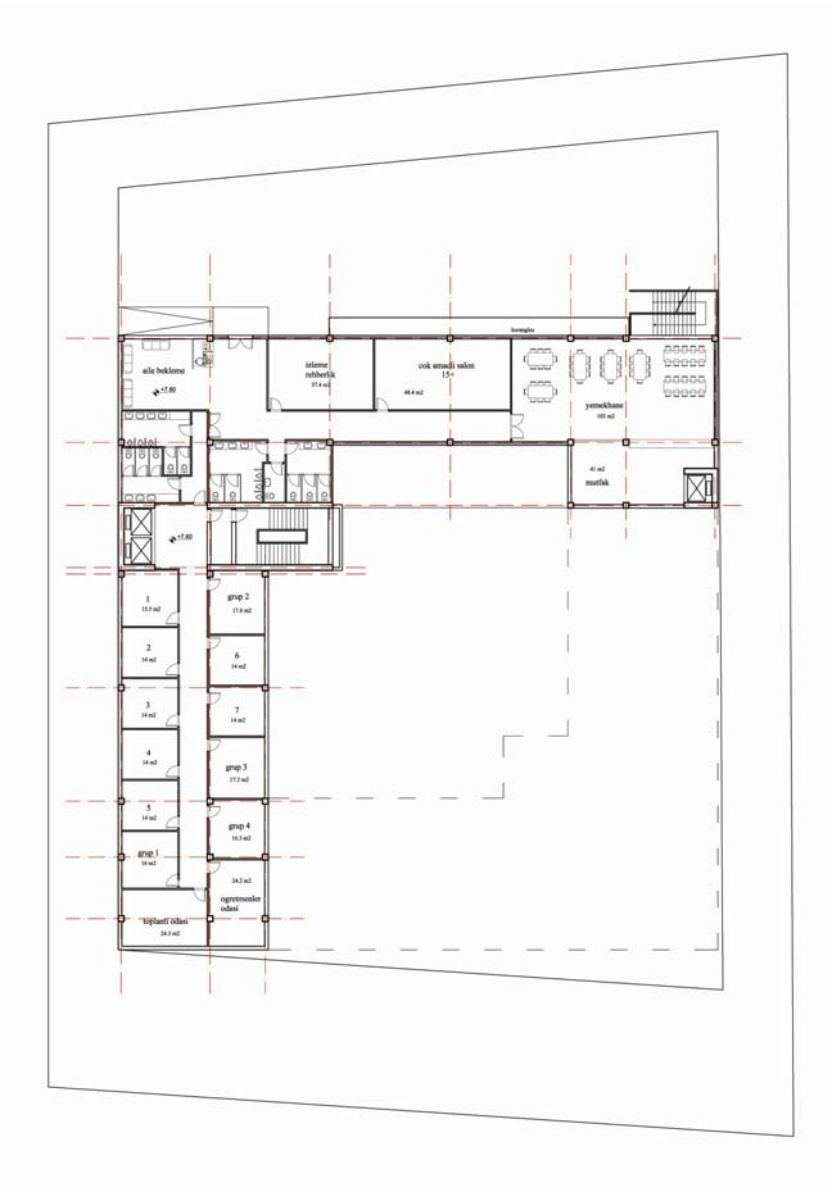

Figure 5.7: Second Floor Plan / Preliminary design for Private İlgi Special Education School

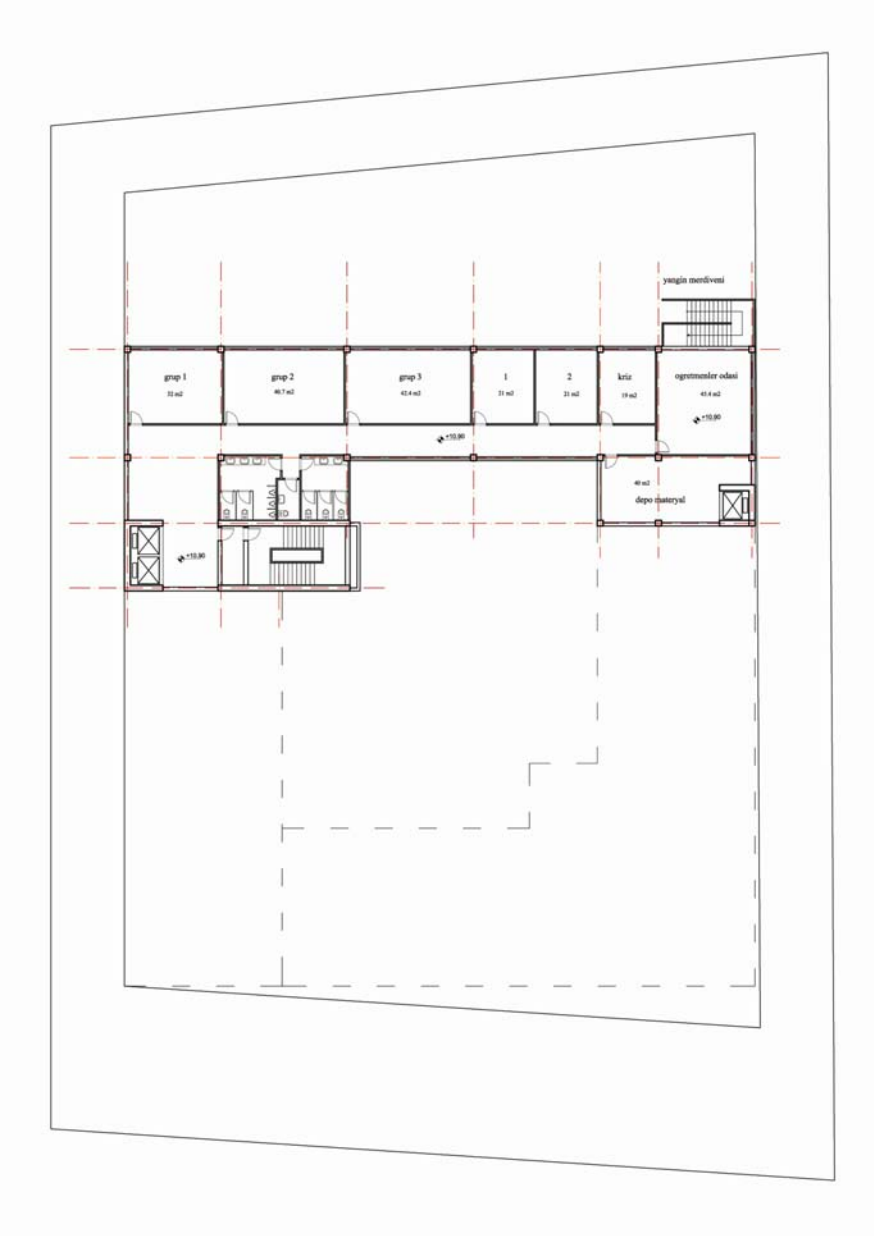

Figure 5.8: Third Floor Plan / Preliminary design for Private İlgi Special Education School

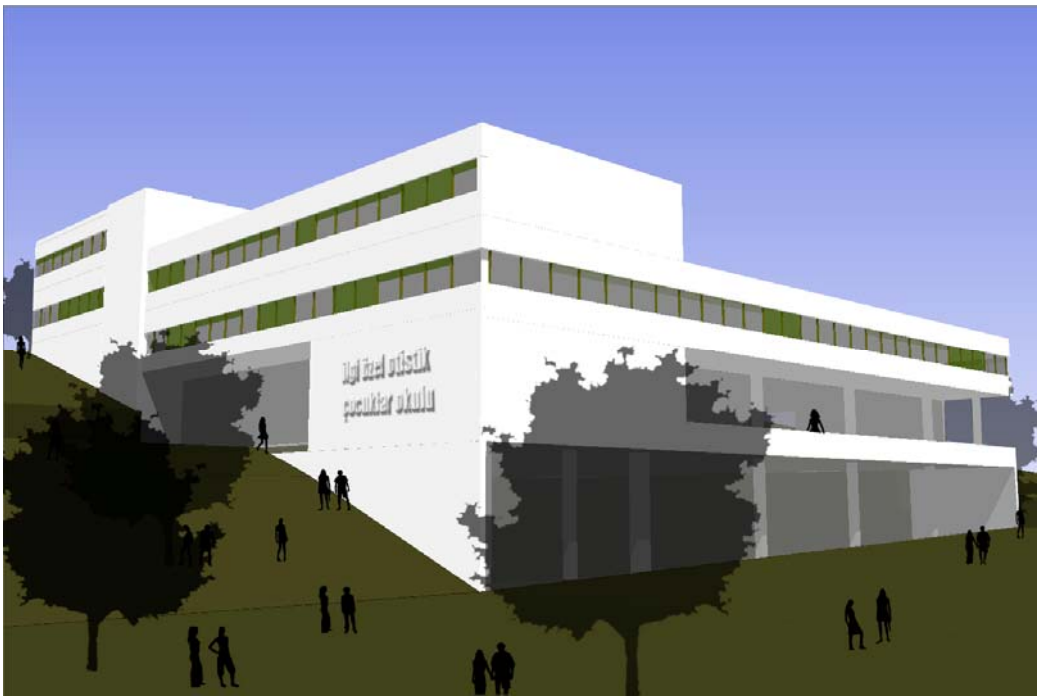

Figure 5.9: Perspective study showing the preliminary design

5.2 Revised Design: Appraisal of the Preliminary Design and Design Suggestions

After the research on autism and architecture for autism, a revised design has been made by the author for Private İlgi Special Education School. This section of the thesis evaluates and make some suggestions for the preliminary design for the school, according to previously mentioned architectural guidelines. The changes have been made in various subjects; program elements, layout of classrooms, lighting solutions, acoustics, the façade, color scheme and materials, keeping the same site and design decisions.

Figure 5.10: Perspective study for the revised design

5.2.1 Site

There was not a chance to select the place of the site since it was a donation from the Ankara Governorship. The advantages were its being in the city center which facilitates accessibility and the site reserved for a playground adjacent to the school site. Yet its shape was a challenge for the design. Both its size being insufficient for the requested program and the heavy inclination in the site were compelling yet the level difference enabled for separate accesses for the shops integrated to the building and different education units, offering outdoor play areas in both levels (**Figure 5.11**).

Figure 5.11: section showing the level difference

5.2.2 Planning and Layout

The general plan of the school with building blocks enclosing a central courtyard, enables more light and natural ventilation for the school. The most welcomed idea however, was the safe and intimate internal courtyard where children can perform outdoor activities away from traffic and strangers. The design was planned to avoid high façades around the courtyard to ensure light penetration and avoid overwhelming façades. The terrace planned on the west façade also detaches the massiveness of the building.

The planning of different spaces was consistent with the “sensory zoning” theory of Magda Mostafa. Mostafa stresses the effectiveness of this concept by pointing out the difference in environmental perception of autistic children which results in differentiating the places according to low or high stimulus spaces. Therefore Mostafa suggests grouping these high-stimulus zones such as music and art rooms, ateliers or gymnasium, together and as far as possible to the low-stimulus zones like classrooms or therapy rooms (205). In the design, the conference hall, and the dining hall were located on the ground floor. Similarly the gymnasium disposed on the basement floor let the upper floors to keep their autonomy for children to learn in a calmer environment. Additionally the waiting areas for parents, the monitoring and guidance rooms are also situated on the ground floor eliminating the need of parents to enter the upper floors. The unit for children post-15 located on the east side of the site is a separately working part in the building embodying the same principles. The classrooms are separated from the dining hall and parents’ waiting area on the upper floor.

5.2.3 Program Elements

The program of Private İlgi Special Education School differs from other special education schools mostly with its shops integrated to the school building. These shops provided for the public use, allow children to gain job related abilities and social skills and also exhibit and sell their works. Another advantage of the shops is that they provide an encounter space for the community and autistic children, increasing the awareness about autism in the public.

One other extra-curricular program element was a guesthouse for families coming from other cities. It was unfortunate though that the construction of the guesthouse and the hydrotherapy pool had to be cancelled because of money scarcity and the size of the site. Yet teachers can take children to the pool of other schools which would help also to communicate with other children.

In the program of Private İlgi Special Education School, different sizes of classrooms, to be used as individual and group therapy rooms, workshops and occupational therapy rooms are present. Adding to these some spaces reserved for classrooms can be used as a music room and swing/sensory room which positively affects the education of an autistic child. The rooms which are located on the corners cannot benefit from natural daylight if they do not extend along the façade. These rooms can be converted into dark sensory rooms where light play can have both an educative and relaxing effect on children.

Apart from these, the remaining program elements seem appropriate for the education and well-being of children. Adequate space is provided for teachers, administrative units and for parents. The cafeteria and the terrace for the parents is hoped to provide a more pleasant experience for them while waiting their children. The gymnasium, the dining hall, the

courtyard and the rear garden as outdoor spaces, and the conference hall where both performances of children and lectures to inform parents can be staged, are provided as recreational spaces.

It is very crucial that the outdoor play areas provide a safe environment for children where teachers do not have to watch for them all the time. In this sense both the courtyard and the rear garden for children post-15 composed in the design were very welcomed from the staff of İlgi Protection of Autistic Children Foundation. The courtyard enables outdoor activities to be conducted in a safe environment. To enhance this safety, the passage underneath the school, for the playground situated in the site nearby, requires further control with maybe a fence or a low wall with a controllable passage door (**Figure 5.12**).

Figure 5.12: view from the courtyard

The school has a flat roof, so the roof can also be used as an outdoor activity space. In the revised design doors opening to the roof terrace and adequate parapet height is proposed for the secure use of these spaces.

Figure 5.13: Use of terraces

As another recreation space a library could have been beneficial for the school. The best solution for its place seems to convert one of the shops into a small library without compromising the space for education units and providing a library where the public can also benefit from.

5.2.4 Layout of Education Spaces

The classrooms were tried to be designed as wide as possible within the restrictions of the site and surface permit from the municipality. It is possible to say that the inside space meets and extends the minimum area requirements cited in the regulations of Republic of Turkey Ministry of National Education, and is available for the “spatial sequencing” of the classroom, a principle again pointed out by Magda Mostafa (2008) emphasizing the importance of compartmentalizing the classroom according to various tasks and retreat places. Mostafa, claims that children will learn best and can concentrate more on educational tasks in such a room creating a predictable environment which also satisfy these children’s need for the routine (193).

In the subject of classroom layout, a design proposal can be made for Private İlgi Special Education School (**Figure 5.14**). Here the entrance to the classroom is provided through a semi-private preparation space where children can sit and relax for a while after a possibly overwhelming journey to the classroom. This space can allow the teacher to prepare the children to enter the room also providing coat hangers and cupboards to leave unnecessary belongings outside and to start the education process before entering the classroom in a safer and more intimate semi-open space. The second reason why such a scheme has been adopted is the condition mentioned in the regulations of Republic of Turkey Ministry of National Education. The document specifies that the doors of the classrooms should open into the corridor. Furthermore in the case of a double loaded corridor where both sides of the corridor are occupied by classrooms, the door openings should not be placed opposite to each other (MEB, 2007). In order to implement these principles, it might be conventional to introduce these preparation spaces for the entrances to classrooms both securing doors opening to circulation spaces without compromising the flow in the corridors and preventing opening of the doors looking face to face.

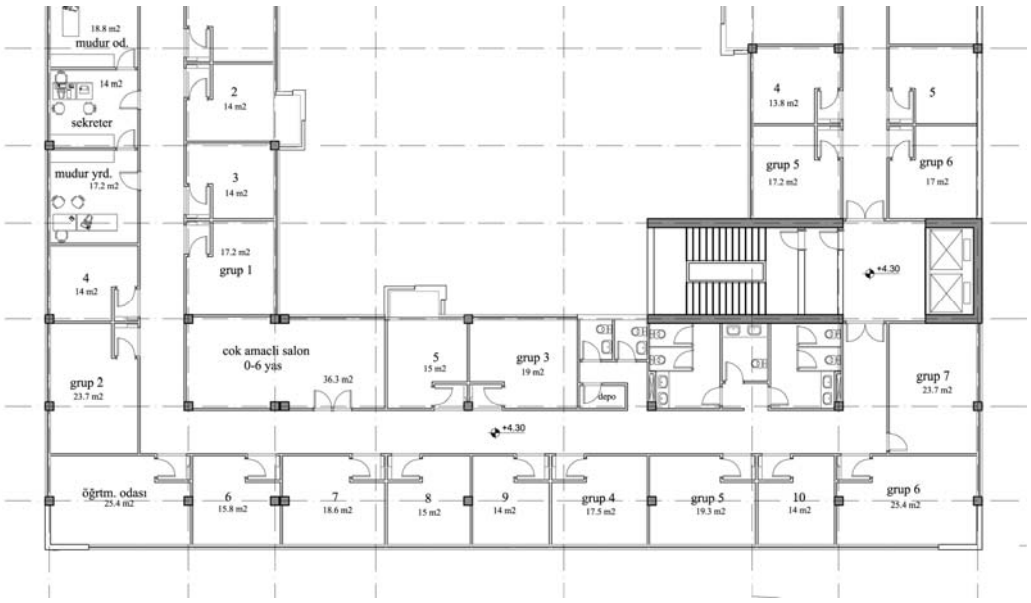

Figure 5.14: Plan section showing the new classroom entrance proposal

5.2.5 Circulation Spaces

The preparation spaces also contribute to reduce the monotony in the corridors. Further openings for larger gathering areas could have been introduced to the corridors if the program was not too dense. Airy and well-illuminated corridors make an excessive contribution for a good state of mind when beginning the education, similarly the quality of this space is important for the child to keep his/her concentration when transitioning from one place to another. For introducing more light into the rather dark corridors, roof lights have been adopted into the design (**Figure 5.15**). These top-light systems provide a brighter and more airy atmosphere for the circulation spaces. For Unit D this system is not used because the plan scheme provides a single loaded corridor where light can enter the building from the side.

Furthermore clerestory windows are planned to be placed on the walls between the rooms and the corridors which can provide additional light penetration into the corridors. For the vertical circulation cores, additional openings are placed for light penetration in the stairs.

Figure 5.15: Perspective showing top-lights, clerestory windows and bay-windows

5.2.6 Lighting

About the lighting of the school further measures have been taken. After finding out from readings, examples of special schools and interviews with teachers, clerestory windows seemed a good lighting system for schools for children with autism (**Figure 5.15**). These windows both conceal distracting views from outside, eliminate the escape risk from the window and provide a more even throw of light into the classroom area. Since the windows are inaccessible to children, the skirting does not constitute a threat for injuries. As a consequence most windows are converted to clerestory windows in the revised design.

Yet in order to provide different education conditions, projecting bay windows have been introduced (**Figure 5.16**). These windows, scaled to the height of a child, provide a withdrawal space if needed. Parents frequently mention that their child likes to sit in small, enclosed spaces like under a table, inside small cupboards or under blankets. Catering to the child's need for an enclosed space, s/he may be more open to learning to communicate or just relax for a while when felt overwhelmed. Claire Vogel in her article "Classroom Design for Living and Learning with Autism" states that "small, enclosed spaces tend to enhance feelings of closeness, intimacy, and safety". She quotes an occupational therapist who claims that "some kids start off a lot better in smaller spaces like a tent, with as little in the space as possible, just a few choice items" (Vogel, 2008:7)

Figure 5.16: Projecting bay-windows

Furthermore it is stated by the specialists and caretakers of autistic children that sometimes it is more convenient to communicate with the child when s/he is more relaxed and open to interaction. The video films of the children with autism show a repetitive behavior for almost all children, which is, going by the window and watching outside when felt over-stimulated. This behavior may not be desired during education since full attention of the child should be on his/her teacher and learning task. Nevertheless, some children may be so withdrawn to their world that they can only be reached through an activity they enjoy. Teachers often use this technique to reach children and educate them at the same time by narrating the outside world, asking questions and slowly forcing children to participate (Personal interview with Öktem, 25.09.2009). Consequently, these projecting bay windows are hoped to provide a cozy space for such activities. In these rooms with projecting bay windows further openings for light have been procured in case a teacher wants to close the overlooking glass in order to attract the child's attention to a learning task.

Figure 5.17: View of the courtyard from the bay window

The glass used in the window areas should be before all resistant to impacts (Personal interview with Karasu, Şahin and Mercan, 04.04.2009). In the case of Private İlgi Special Education School, the bay windows probably possess the most hazardous window area since it provides a direct access because of being at child scale. It is fundamental that these windows are supported with durable glass. The glass type used in the windows are also important. Sandblasted glass might be preferred in areas where excessive glare occurs to provide an even and less powerful light which is less distracting for children with autism (Humphreys, 2008:7).

The artificial lighting should also be carefully chosen, avoiding fluorescent lamps and providing a dimmer switch to allow different levels of light for the needs and sensibilities of different children (Personal interview with Karasu, Şahin and Mercan, 04.04.2009).

Light shelves, sun shades, blinds and curtains are lighting control solutions which should be introduced where necessary. It is important that these are manufactured with robust and easily cleanable materials. The “strobe effect” caused by slatted blinds are also to be avoided (BB 77: DfEE, 2005 Section 5.1.4). Because of the inconvenience of this situation the slated sun shade used in the terrace of Unit D, in the first sketches are eliminated

in the revised design. These are replaced with a projecting roof line which covers the top of the terrace and act as a shading element as well (**Figure 5.18**).

Figure 5.18: Previous design, and the new proposal for the removal of slatted sun shades

5.2.7 Acoustics

The importance of acoustical treatment for education spaces was many times highlighted by the administrators of İlgi Protection of Autistic Children Foundation. Nevertheless not only providing a soundproofed room, but also decreasing reverberation is crucial for these spaces. Furthermore it is important to provide various rooms with different acoustic qualities (Mostafa, 2008:204) which was unknown for the author in the preliminary design process. A fully soundproof room may help a child with severe sensory problems to initiate communication. It is desired for these children however, to be able to adopt into an acoustically normal room where others do not find it very disturbing. In consequence a gradual series of rooms with different acoustic qualities is proposed in the revised design to slowly accustom children to various circumstances.

Consequently the different spaces for education and recreation were revised, bearing in mind that further attention should be given for larger spaces like the gymnasium, the dining hall and the conference hall. The classrooms surrounding the courtyard has to be more elaborately studied

as well since loud activities can take place in the courtyard. The classes on the west side of the building are also prone to let more noise inside because of the main road passing in front. Avoiding reflective hard surfaces on exterior walls can contribute for the solution (BB 77: DfEE, 2005 Section 4.9.4). In this sense the wooden panels proposed on the façade can provide a better acoustic in the building.

The use of various materials inside the building to decrease reverberation is also very important. Appropriate sound insulation systems and materials should be introduced to the interior space for a calmer surrounding for autistic individuals. These should be chosen according to a acoustic specialist's suggestions and should be designed carefully.

5.2.8 Color scheme

The color scheme of a special school for autistic children should provide a calm and relaxing environment. Various color combinations for a tranquil setting is shown below to give an idea about available colors for such an environment, from the book "Color Harmony – A Guide to Creative Color Combinations" (**Figure 5.19**).

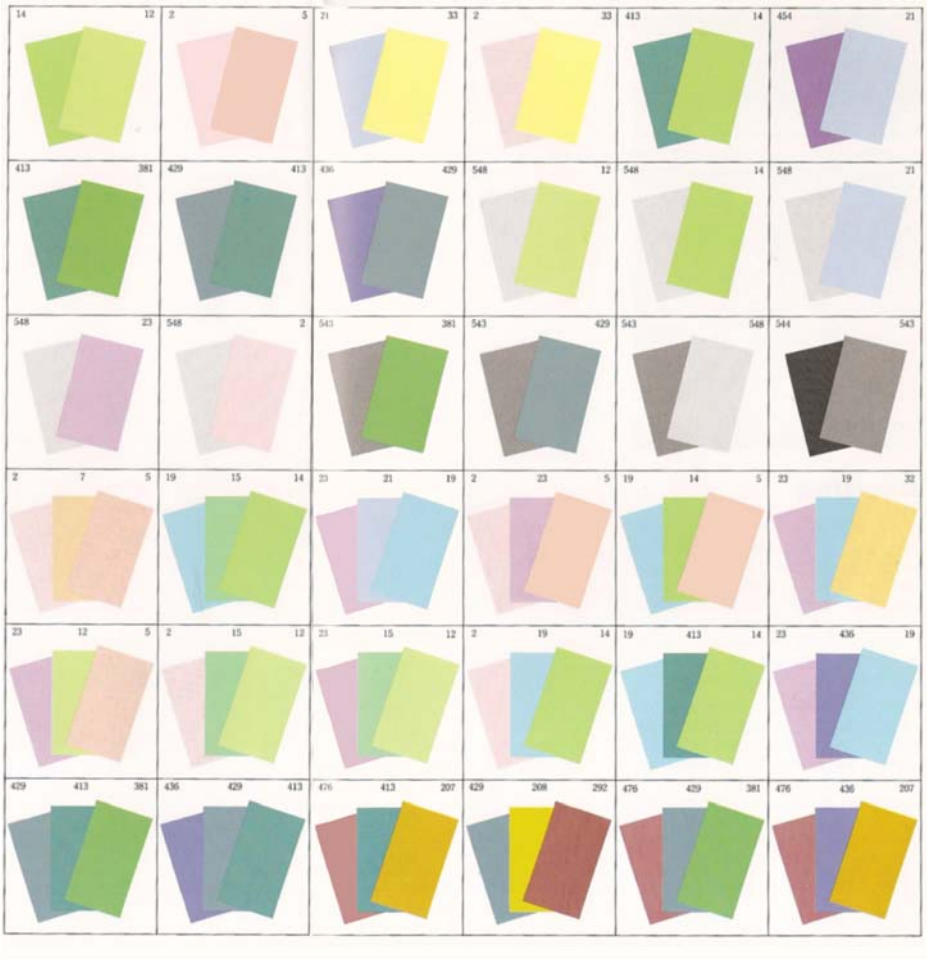

Figure 5.19: tranquil color combinations (Color Harmony – A Guide to Creative Color Combinations, 1987:28-29)

Wise use of colors can both provide a soothing effect on children and facilitate orientation and circulation. The color coding of different spaces and providing landmarks and visual cues help children to perceive and understand space around them and ultimately facilitate navigation in the school, independently. Consequently color coding would be helpful in the new building for Private İlgi Special Education School. Different colors can be chosen for different units allowing the users, visual cues about where they are and alerting children if they pass into a different unit. Various shades and hues of the color of that unit can mark the different use of space like individual and group therapy rooms, restrooms, sensory rooms, workshops or offices for the administration.

CHAPTER 6

CONCLUSION

Autism is a pervasive developmental disorder that is seen more and more in the society and it significantly affects the lives of many people. This disorder imprint and change the lives of not only those who have autism but also their families and close ones. Each individual in th autistic spectrum is affected by autism in different areas, with various degrees. Consequently as it is put by Cathy Pratt, the director of IU's Indiana Resource Center for Autism and board chair of the National Autism Society, “if you know one person with autism, you know one person with autism” (bloomingtonalternative.com). This complex developmental disability affects mostly a person’s ability to communicate and interact with others. It typically appears during the first three years of life and is a lifelong condition which requires intensive education for treatment. It is defined by a certain set of behaviors and is a "spectrum disorder" which can cause additional difficulties in terms of sensory perception, mental retardation and difficult behaviours.

As it is mentioned before, there are many approaches regarding the education of autistic children. The choice between institutionalization, home care, group homes, mainstreaming or special education schools is shaped according to education choices, children’s age, the severity of symptoms and their intellectual capabilities. The main aim of special education is to elicit, as much as possible the independence of autistic children and their ability to coexist with others without problems, by teaching them communication and every-day living skills.

The thesis aims to draw architectural guidelines for the design of a special school for children who are diagnosed with autism and who require special education support. These architectural principles are hoped to aid architects who will work with similar architectural programs in the future. Information gathered from the architectural literature and case studies have shown that, while designing a school for autism there are some main topics to pay attention to, some of which are common principles for all schools yet more crucial for children with autism and some are specific to the case of a special education school for autism.

For the general character of the school, the specialists and teachers working with autism highlight three fundamental concepts which are simplicity, flexibility and safety. Because these children dreadfully differ from each other in terms of sensory difficulties, communication skills and intellectual capabilities, the flexibility of the space gain more importance than any other school. The teachers should be able to transform an environment on a moment's notice, according to the child's needs, sensibilities and obsessions. Taking measures for the safety of the environment is especially important for a school for autistic pupils, since these children are more open to various hazards because of their disabilities to perceive their environment. Moreover many children with autism exhibit problematic behaviors which results in injuries. The calmness and simplicity of the environment is desired again because of the children's difficulties in perception of the environment caused by their sensory disabilities, and the stress factor caused by too many stimulants. Therefore the school should provide a calm and ordered environment for these children, also allowing to introduce additional stimulus for those who might need them.

The design tools to ensure a better education environment for children with autism were tried to be discovered in the thesis. Apart from the site

selection, the planning of the school and the program elements, some other design elements contribute for the well-being of the pupils. Providing good lighting and acoustical environment is of great importance. A welcoming, pleasing and relaxing school can be attained through the use of various design tools like the color scheme or the sense of rhythm. Furthermore with carefully chosen materials for coating and paving that would not trigger an obsession, children can more easily concentrate on their tasks. Whether or not the architect of a special education school is expected to design the furnishing elements, having a general idea about its requirements, enhance the design process. Even the smallest detail like the place of a light switch can contribute for the well-being of both children and their teachers and parents.

The challenges of designing a school building for autistic children have been experienced by the author in 2007, when the founder of İlgi Protection of Autistic Children Foundation, Nejla Arslankurt requested a design for their new school building. The preliminary designs were made in coordination with architect Kadri Atabaş. After the research about the design principles for a special education school for autistic pupils, the preliminary design was revised. The thesis aims to make an appraisal of the preliminary design by offering some new suggestions in accordance with the research outcome. The main suggestions can be summed up in five topics, namely the changes in the program elements, suggestions about the natural lighting solutions, acoustics, renewal on the layout of classrooms and circulation spaces and some suggestions about the façade and the materials used in the school. In the subject of program elements, sensory rooms and a library can be beneficial for the school. The lighting means is transformed into a system mainly composed of clerestory windows, but also providing child-scale projecting bay windows for a variety of different experiences. Top lighting systems to illuminate the rather dark corridors have also been introduced to the building. The problematic areas in terms of acoustics have been deducted which are the

classrooms around the courtyard and near the main road, and larger spaces like the gymnasium and the dining hall. Providing a series of acoustically treated rooms is also important in this subject. A preparation space which was introduced to the entrances of classrooms changed the layout of education spaces and the perception of the corridors.

In brief, the design of a special school for children with autism should be elaborately studied in every aspect considering the needs of these special children, their fears, obsessions, and sensory sensibilities. It is crucial to provide them a welcoming and inclusive environment which evokes a feeling of belonging. Procuring their safety without overwhelming them, and allowing a simple yet flexible environment respecting their different needs and characteristics help children to gain important skills in terms of socialization, communication and independence. It is hoped for better schools and education centers to be built in Turkey, allowing further investigation of the effectiveness of previously stated design guidelines. As a final statement the greatest wish would be a further consideration of the urban environment matters which are beyond the scope of this thesis for all people to share the urban experience simultaneously.

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