EVALUATING ARCHITECTURAL DESIGN FOR THE DISABLED STUDENTS IN LIBYAN HIGH SCHOOL

A THESIS SUBMITTED TO THE GRADUATE SCHOOL OF APPLIED SCIENCES OF NEAR EAST UNIVERSITY

By

MILAD E. MOHAMED EDLEIM

In Partial Fulfillment of the Requirements for the Degree of Master of Science in Architecture

NICOSIA, 2019

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Approval of Director of Graduate School of Applied Sciences

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We certify this thesis is satisfactory for the award of the degree of Masters of Science in Architecture

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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 I have fully cited and referenced all material and results that are not original to this work, as required by these rules and conduct.

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Signature:

Date

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I send my love to my wife and children in Libya for their strong support and patience towards the writing of this thesis.

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ABSTRACT

The thesis describes the situation of the disabled Libyan students in terms of architectural design plan and its implementation. Due to the ignored architectural design of school building with considerable consideration for the disabled students, the research based its focuses on high school buildings in Libya with hope of understanding the rooted problem of the ignored consideration of architecture design in the construction of school buildings in Libya. To comprehensively achieve this, survey was carried out by selecting ten random government owned schools in Libya for the purpose of research.

The cooperation of the respondent's result gave an insight to the basic architectural needs of the Libyan students through interviewing, and questionnaire analysis. Furthermore, the thesis explains architectural plans, ideas and examples of implementation of several architectural design for the disable students worldwide which could be an adoptable system for the Libyan high school architecture plan. The author hope the government of Libya, Education Board would adopt the standardize architecture plan for the betterment of the Libya schools.

Keywords: Libyan high schools; high school survey; design evaluation; disabled standards; evaluation of standards

ÖZET

Tez, Libya'daki lise binalarını engelli öğrencilerin mekansal kullanımı açısından, mimari tasarım planlarını ve uygulamalarını standartlara uygunluğunu ele alarak incelemektedir. Çalışma'da, engelli öğrenciler için dikkate değer bir şekilde göz ardı edilen okul binalarının mimari tasarımlarındaki sorunları tesbit etme, anlama ve öneri geliştirme amacıyla Libya'daki lise binalarına odaklanmıştır. Literatür taramasıyla elde edilen kriterlerle format elde edilmiş ve Libya'da devlete ait on adet lise binası kapsamlı bir şekilde özürlüler açısından incelenmiştir.

Libyalı liselerde okuyan engelli öğrencilerin temel mimari ihtiyaçları, görüşme ve anket yoluyla tesbit edilmeye çalışılmıştır. Tez'de aynı zamanda, Libya'daki liselerde de uygulanabilecek, dünya'nın çeşitli yerlerinde özürlü kullanımına uygun olarak geliştirilen başarılı mimari çözümler ve fikirler örneklerle anlatılmıştır. Sonuç bölümünde ise, Libya devletinin eğitim yapılarının özürlü kullanımı açısından dünya standartlarına taşınabilmesi için analizler ve öneriler yapılmıştır.

Anahtar Kelimeler: Libya'da lise yapıları; liselerde mimari analiz; tasarım değerlendirme; engelli standartları; standartların değerlendirilmesi

ABBREVIATIONS

UNICEF	:	United Nations International Children's Emergency Fund
NGO	:	Non-Governmental Organization
CRPD	:	Convention on the Rights of Persons with Disabilities
ADHD	:	Attention Deficit Hyperactivity Disorder
WHO	:	World Health Organization
EPSEN	:	Education for Persons with Special Educational Needs
ADA	:	Americans with Disabilities Act
ADAAG	:	Americans with Disabilities Act Accessibility Guidelines
PWD	:	Person with Disability
ANSI	:	American National Standards Institute
SCI	:	Spinal Cord Injury

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CHAPTER 1

INTRODUCTION

The thesis significantly explains the disabled architectural situation in Libya. Following the identification of the ignored architectural situation of the disabled in Libya, the research thesis promotes innovative practices using advance architectural design as a case study. Although the thesis focuses mainly on high school buildings, however the awareness and design for the disabled adopted in this thesis can be implemented for preschool, high school and university.In previous studies, it was emphasized by most of researcher that, the regulations for the disabled persons are quite not given some proper considerations from the environmental economic and social point of views such as health facilities, institutional learning, ministries and other sensitive buildings used for human wellbeing (Rivono, 2004; Gleeson B, 1997). The fundamental reason on this exclusion largely depends on the inadequately designed cities and proper application and implementations for laws and regulation imposed to the countries. This is indirectly tarnishing the socio-economic impacts and opportunities of disabled peoples (MCclain and Todd, 1993; Useh et al., 2001). In addition, according UN convention on human right with disability globally, it forecasted that almost about six hundred and fifty million peoples are leaving with one or more type of disabilities and as such they can be considered as world's largest minority. Among the disabled population it is estimated that, around eighty percent were from the developing countries (Imrie, R, 2009). This implies that, out of almost 6.3 million people in Libya the internal disabled people in occupied almost 8% of the total population (UNICEF, 2016; Cusick and Sahly, 2018). Since the disabled peoples are occupying the larger percentage internationally, therefore it is necessary to accommodate and create the accessibility regulation and laws in all the sectors we have. For example, in all the aspect of engineering and architecture related disciplines such construction and buildings there is no contradiction in explaining the meaning of word building, as such building refers to as any structure made by human being which is aim for supporting and sheltering the sustainability of the occupant or inhabitant. Building in it is general context was designed to serve and support the life both in term of social, economic and environment point of views. It also includes privacies, space analysis and accessibilities.

1.1 Thesis Problem

In this thesis, the research problem is to find out if high schools in Libya are designed according to evaluation criteria of disabled standards.

Disabled are the most helpless and weak in the society when it comes to regulations and accessibility in the public buildings, therefore it should be made accessible for them, especially by considering the reason that, human being naturally needs shelter, comfort, safety and laws and orders (Jenks, M 2007). For physically disabled peoples, discrimination and accessibility to build environment becomes the major concern which hinder their movement and social lives, most importantly during the urban and architectural planning and design. For any building according to the standard should provide accessibility and provide all the regulations for disabled peoples accordingly. However, regardless of any financial capabilities and physically abilities, the public building should provide with all the shelters to all the users (Harnik, 2003). This is due to the fact that, the regulations in term of accessibilities provides maximum freedom and comfortable ease the general users. The group of peoples or individual may intent to carry out different assignment in the building both urban and rural areas. Nowadays, regulations set on pubic building are increased and promoted due the attentions drawn by many NGOs and research papers, but still long way to go and it generally attained below the international requirement (Useh et al., 2001).

1.2 Aims and Objectives of the Study

The study aims to investigate the possibility of improving safe architectural design for the disabled in Libya. Although the research mainly focuses on the high school students in Libya, the discussion in the thesis can however be implemented for any schools in Libya and beyond.

The objectives of the study are;

- To review the previous literature on the human right regulations for disabled people
- To investigate how, and to what extent the disabilities regulations are in practice at school buildings in Libya.
- To point out the regulations and legal duties on government for accessibility of the disabled in school building environment.

- To illustrate architectural disabled standards suitable for the adoption of high school in Libya.

1.4 Limitation of Research

The research is limited with the analysis of space accessibility of disabled students in selected ten government high schools of Libya.

1.3 Methodology of the Research

In order to reach the aims and objectives of the thesis, four steps has been followed. Firstly, comprehensive literature research had been done on the required space standards for the disabled students in high schools. Secondly, the interview with school staff and questionnaire with some students in the school had been carried out. Thirdly, physical space analysis of ten high government schools in Libya had been done by using an evaluation form which is developed to examine the building programs of high schools considering requirements for disabled students (see Figure 1.1.Evaluation form for the building programs of high schools in Libya considering disabled students). Fourthly, all the analytic findings of these schools are compared and discussed.

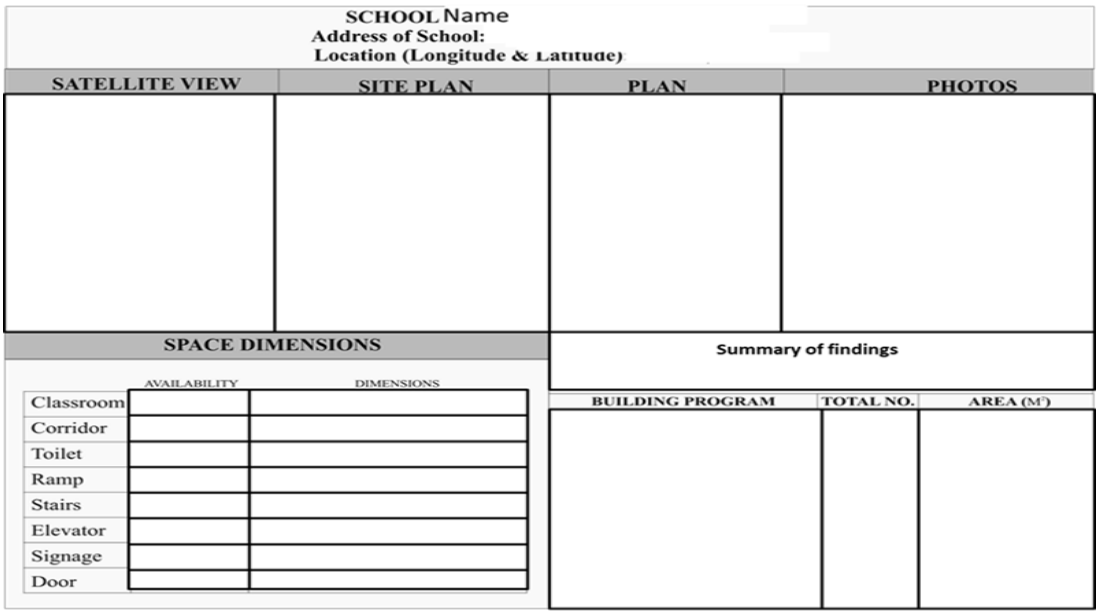


Figure 1.1: Evaluation form for the building programs of high schools in Libya

The General structure of the thesis is expressed in Figure 1.2.

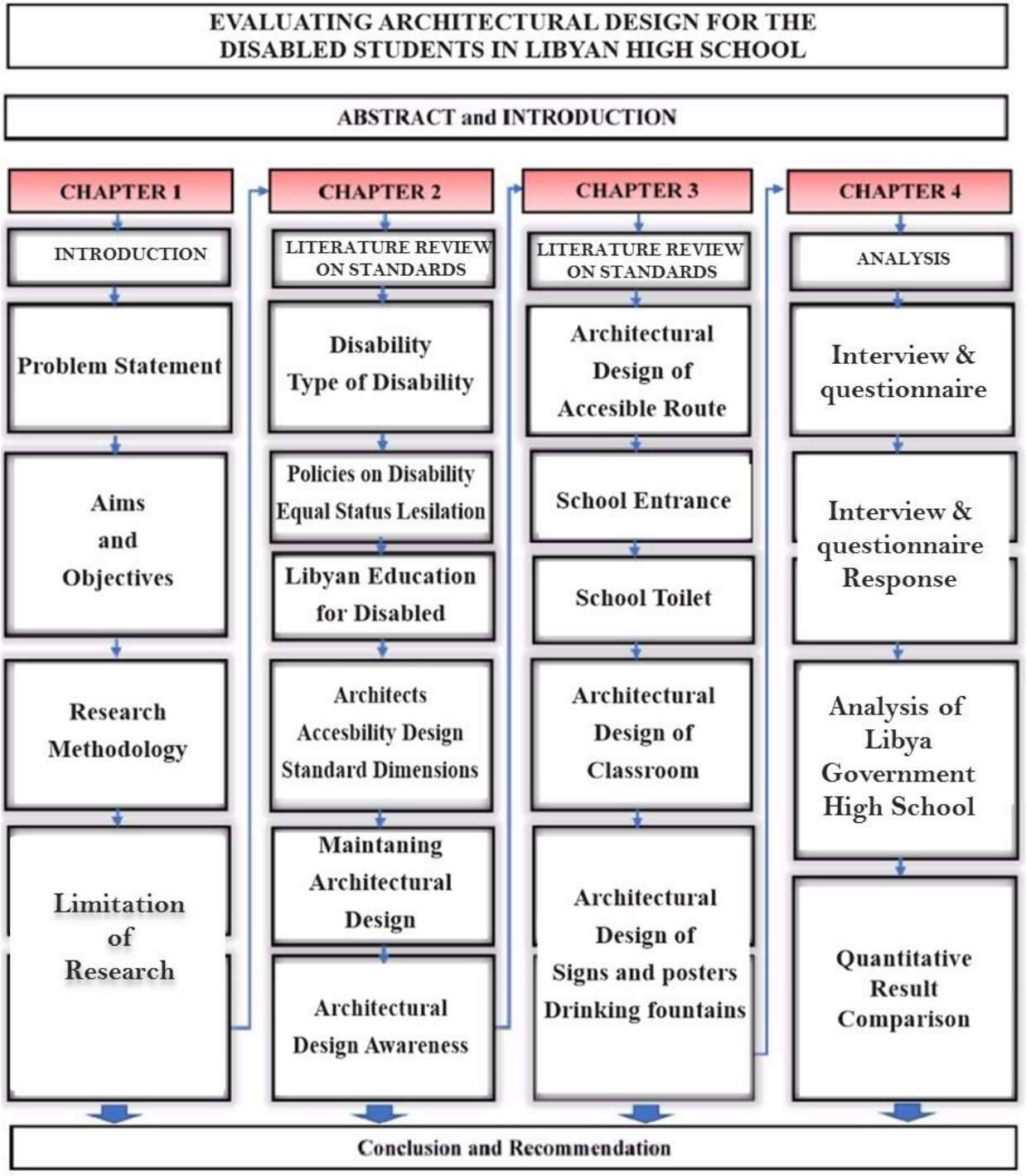


Figure 1.2: Thesis Structure

CHAPTER 2

BACKGROUND

2.0 Introduction

In this chapter, an extensive review of existing literatures related to this research with the aim of presenting the work done as well as presenting the gaps available for further studies are presented. The 2006 census data reported that there are about 5% of children which are of school age (4 – 18) falling in the high school category is disabled in Libya

Table 2.1: National Survey of Disability, 2006 vol 1. (National survey, 2006)

Principal Disability	No's of Children
Moderate to profound sight difficulty (while wearing glasses)	2,700
Moderate to profound hearing difficulty	3,300
Mobility or dexterity difficulty	8,100
Diagnosed intellectual disability	21,400
Mental health disability	9,900

2.1 Disability

Disability explain a deformity in the social sciences, presented and explained a picture of human body, with head and face removed, on a wheelchair, at the end of stairs, that not a minimum of 5 concepts of disability could be seen to reflect. Firstly, functional definition of disability as the common knowledge of disability, is defined as the person who uses wheelchair and cannot walk up the stairs. Secondly, from an environmental definition, disability is also conceived as the person using wheelchair cannot get up the stairs i.e. as a result of the relationship between the person with disability and the environment they are living in. Thirdly, disability can be defined as the social barrier that may obstruct disabled persons from taking part in social activities for instance; even without the wheelchair, the stairs will be a cause for the disability for these persons (Grönvik, 2007). Another definition which is stated to as the social model of disability which can be seen as the physically disabled persons who have a few definitions of

administrative disability or have the knowledge of mobility aid and gain access to it even if the person is on a wheelchair (Zola, 1993). Grönvik defined disability as whether the administrative system or people see the person as disabled or the person sees himself/herself as disabled. These five probable concepts are not the end of the complexity of what disability means (Grönvik, 2007). Various personality signs, e.g. nationality, gender, class, sexual orientation and race connected to disability means that irrespective how disability is defined, the understandings of disability will vary among people. Therefore, the laws and policies have to be subtle with regards to these familiarities as subjected by social, complex, environments and interconnecting particular variables. The difficulty in understanding disability forces to explain why the interest in disability in particular cases, mainly paying attention to the person's structure, social movements, organizational systems, built environment or their combination (Bruce, 2014).

The UN Convention on the Rights of Persons with Disabilities (CRPD), appears to approve the last definition inside its international rights bodies and many national organizations all over the world as well as South Africa. The focus on only the individual as the functional definitions which change to the focus on the physically disabled persons and their surroundings as the environmental definitions, has been acknowledged (United Nations, 2006).

2.2 Types of Disability

Disabled or deformities can be named as the inability of the individual to do his or her everyday exercises. Different kinds of disabilities incorporate different physical and psychological problems that can obstruct or decrease a person's capacity to do his everyday exercises. Disability can be separated into various classes as Nazarov and Lee (2012) say;.

Mobility and physical impairments

Individuals with different physical disabilities are classified here:

- Lower arm/leg(s) disability
- Upper arm/leg(s) disability
- Disability in various organs of the body
- Manual dexterity

Movement disability can either be by birth or developed with issues relating to age. There could likewise be the impact of an ailment. Individuals with a partial bone damage also belong to the class of handicap.

Spinal cord disability: While total damage brings about a complete non-functional of the sensual organs. At times, spinal cord handicap can be a birth deformity. This sort of damage happens mostly because of extreme mischances. Spinal cord injury (SCI) can once in a while prompt long lasting inability. The damage can be either total or partial. In partial damage, the messages passed on by the spinal cord isn't totally lost.

Head injuries - brain disability: Brain injury lead to cerebrum damage. This damage can be slight, moderate or extreme. The two types of brain damage are further described. Traumatic injury of the brain results from behavior disorder and emotional de-function while, Acquired Brain Injury certainly occurs after birth. The reasons for such instances of damage are numerous and are primarily as a result of outer powers connected to the body parts .

Vision disability; There are a huge number of individuals that experience the minor to different disabilities. These injuries can likewise result into some major sicknesses like visual deficiency and visual injury. A portion of the normal vision weakness incorporates damages to the eye causing its dryness.

Hearing disability; The term “Deaf” is referred to people with hearing problems. It comprises of people that cannot hear totally or partly. Hearing problem can be by birth or caused biologically e.g. meningitis (which can destroy the hearing nerve). Partially deaf people can improve their use by the hearing of hearing aids.

Learning inability; These belong to the category of neurologically-rooted problems which directly or indirectly affects the learning ability of students. Such examples include; students with high level anxiety, attention deficit hyperactivity disorder (ADHD) students, student incapable of processing information, dyslexia students and many more.

2.3 Policies on Disability

According to the World Health Organization (WHO), indiscrimination against all students must be made available, they should have equal chances, equal opportunity in learning, treatment and other school requirement. This protection also extends to the teachers with physically disabilities (United Nations convention, 2006). The building regulation that was published by the Environmental Department applies widely to all new buildings and building materials. Architects who design, construct building plans are responsible for the design of ease of accessibility in their architectural design. Additional inclusions to design most especially for the disabled is the usage of signs such as parking signs, bathroom signs, communication aids in buildings and furthermore is the development of car parking for the disabled.

2.4 Equal Status Legislation for the Disabled

The Libyan law of equal status explains the employment rights of staff, which further extends in the next section to the equality right 1988-2002 of the admission of students which enforces the school board not to discriminate in the admission of students to the school. This particular act disallows the inconsiderate discrimination of disability all across area. The law directly applies to both the administration, the teachers, the engineers and further extends to the architects that would be responsible for the construction of the building. This law prohibits the following; By Libyan lay, admission of the disabled should not be discriminated There should be easy access for all courses school buildings most put in consideration of the disabled. Sanctions or expulsion of students should never be based on the "disability" of the student.

The law further supports either "special" or private accommodation if required for the disabled. Meaning the Libyan high school must provide reasonable architectural design that suits and benefits the disabled by law. Otherwise there is a crucial penalty fine to this.

This law furthers extends to teachers of the Libyan high schools that are also disabled or teachers of the Libyan high school who understands the special needs to the disabled students (such as teachers who understands sign language, teachers who have studied and understand how to cope with the disabled students.

Figure 2.1: Libyan Students in Classroom (UNICEF, 2006)

2.5 Libyan Education for the Disabled

The law that caters for the "special" needs of the disabled is known as EPSEN (Education for Persons with Special Educational Needs Act). This law confirms a child with disabled needs should be in the same class room with the non-disabled child. It further extends to explain that unless this would hinder the disabled students education, or its not in the best interest of the effectiveness of the teaching, otherwise the design of the school building most especially the architectural design, choice of building material (such as acoustic or color contrasting materials) should be considered in the construction of high school buildings that would accommodate both the disabled and the non-disabled students in Libya.

Figure 2.2: Disabled students in Libya (UNICEF, 2006)

In accordance with the Law of Libya, the 2005 Disability Act enforces all external companies to ensure the construction of all buildings, such as school building must be accessible to the disabled. However, the Libyan law permits the construction of "special" high schools mainly for the disabled students of Libya. However, the construction of this type of building does not in any way interfere with the previous law that allow the study of all students irrespective of their physically needs to be able to study in the same class room or environment. The Law moreover enforces architectural design that fits students of all category. The basic requirements for the construction of Libyan school buildings in accordance to the law is summarized: The High schools' buildings must comply with all required law that supports the construction of building system that suits all students of the Libyan high school in comply with the 2015 building regulations. There statutory requirement of all students of the school buildings must be ensured by engineers, architects and the management at large. All building routs, entrance, class rooms toilets must be accessible by all students most especially the disabled students. Teaching communication must be ensured for all students for examples hearing aids or optical aids may be

supplied for the disabled students according to the law to ensure all students possess equal chance in the Libyan high school. According to The National Disability Authority's statutory 'Code of Practice on Accessibility of Public Services and Information provided by Public Bodies' all private and public stakeholders must meet the stated standard of construction building in Libya. However, most high school in Libya does not meet the highly required standard of building construction of high school for the disabled students.

Figure 2.3: School building environment in Libya (UNICEF, 2006)

2.6 Accessibility Design in School Buildings

Developers, architects, designers and head of high school must be accountable for the type of buildings construction they provide. They are held responsible to ensure that the built environment is accessible to everyone wherever it is practical to do so. This includes anyone who is disabled most importantly in the high school environment, or other impairment, whether permanent or temporary, these includes:

- The use of wheelchair, or any type of walking challenge.
- People with infant children with or without pushchairs
- High school students with sight or hearing difficulties.
- Elderly teachers in the high school environment.
- Or student who may have co-ordination or respiratory related problems.

Whereas previous versions of the regulations focused on the high school students needs for the complete building for the disabled students in Libya, the current edition promotes an attempt to include the needs all the students in total (i.e. disabled or not), this law states: There should be full access to and use of school buildings, library and other important stations in the school environment (see figure 2.5). The architectural design for the Libyan high schools must allow a gain in access to all school environment. Easy access to the extensions of such has accessible lift and ramp construction must be ensured by the architectural design to facilitate easy movement in and around the high school environment.

- Sanitary conveniences for all school environments must be ensured.
- Visitable dwellings for parent of the disabled must be put into consideration.
- For students on wheelchair user dwellings, all construction buildings must be constructed in accordance to the Libya Building Construction Law act 2015 as stated earlier.

Figure 2.4: Libyan Students outside school building (https://www.google.com/search? -img.h5moWv4bKR4#imgrc=-kq0ArGbTsOwEM:)

Figure 2.5: Architecture design for accessing surrounding building (Michel Arch, 2018)

2.7 Maintaining Architectural Accessibility in School Buildings

The various methods of maintaining the architectural designs for high school buildings in Libya can be explained as follows;

1. Ensure all disability parking spot are available and accessible for parent, students and visitors.
2. Make sure all signs and posters that symbolizes the “disabled” are placed where needed all around the building of the school.

3. The outside color and lightening condition should be moderate in advantage for the optically challenged high school students.
4. The main entrance should be design to all easy access for all students of the school (disabled and non), keep note that a minimum of one (1) entrance should be accessible should incase there is issue with the main entrance or it seems it is not accessible.

Ramps and steps: In any public service areas most especially a school building, there should slopes that are steeper than 1:20, also, steps and ramps should also be made readily available, architects must ensure the correct design of this (Tiana M, 2013)

Figure 2.6: Accessible School Building Ramp (https://www.google.com/ #imgrc=-kq0ArGbTsOwEM:)

Steps and lifts: For school buildings, steps within a floor in a building should be avoided. Steps should only be designed where it is absolutely necessary, provide a ramp or platform lift as appropriate for the disabled students of the high school (Danso, 2011). If possible, the lift system should be designed for the high school, however the cost implication must be considered thereby

not making the school too expensive for the people. If provided, the maintenance of such structure such as lift must be highly ensured.

Figure 2.7: Lifts and Elevator options in high school building
(https://www.google.com/searchiewagrepr3)

Corridors and doors: The surrounding corridor in the high school environment and doors must ensure the following;

1. There shouldn't be any obstruction in the school building corridors and routes for the physically sight impaired high school students in school

2. All doors should be open all times during school hour if possible, for easy access of the disabled students
3. Wide Doors may be provided for easier access.

Posters and signs for the disabled students; Public buildings most especially a school environment should possess signs to let the disabled students understand where they need to go and how they can easily access the surrounding (Ariffin, 2016). The architects designing should bear in mind the details of the required signs;

1. Architects should design the school building in the easiest way for the disabled.
2. Architects should keep in mind of the bold signs and posters that would allow parent, teacher, students and the public at large of the condition of the school environment as relating to the disabled students.
3. Appropriate diagram, picture to deceits intended warning or sighs should be placed in areas for all to see.
4. Signs and posters should not be designed to pose an obstruction for the disabled

Figure 2.8: Signs and Posters in School building
(https://www.slideshare.com/search64..h5moWv4bKR4#imgrc=-kq0ArGbTsOwEM:)

High School Receptions Architectural Design; The architectural design for Libyan high school must be ensured to be designed in such a way that allows the invitation and encouragement of the disabled students (Ariffin, 2016).

High school class room architectural Design; The architectural design for the classroom must ensure to consider the benefits of the disabled students in the school (Ariffin, 2016). The following must be put into consideration during the architectural design (see Figure 2.9).

1. Visual Information must be readable by all students
2. Designs must ensure the perfect hearing off all high school students in the school.
3. All complicated language or jargon should be understood by the teacher.

Figure 2.9: Teachers encouraging disabled student (https://www.slideshare.com/oq=libyan+ kq0ArGbTsOwEM:)

Architectural design of toilets: Most toilet rooms architecture designs already allow the disability option, however to improve on this, the architectural design may allow the following;

- Alarm system may be provided in the toilet of the school for emergency cases solely for the "special" students. When the alarm system is installed, ensure that there is a member of staff around to asset the disabled students in case of emergency.

- Ensure that the toilet is clean all the time for the benefits of all students irrespective of their challenges.
- Sanitary bins should be provided in accessible toilets and must be placed in places where they do not obstruct wheelchair users.

Light condition: The light in your public buildings should be distributed evenly. There should be no large variations in lighting levels and the light should not be too bright or too dark. Avoid glossy, shiny and polished surface finishes and keep reflections, shadows, and glare to a minimum (Ariffin, 2016).

1. Use differences in colour and colour intensity to create visual contrast. That will help students with vision impairments to:
2. Distinguish between walls and floors
3. Distinguish between door backgrounds and fittings
4. Avoid hazards
5. Find their way around the building.

2.8 Standard Dimensions of Spaces for School Buildings

As regarding the construction and implementation of architecture design of building, there are standard dimensions, area size defined by board of practitioners in the implementation of the design. These includes; classroom, corridor, toilet, ramp, stairs, elevator, signage, entrance.

- **Standard classroom measurement**

According to the National Union of Teachers (NUT), the standard classrooms size is given in table 2.2 with regards to the different types of classroom a high school may encounter, there are different types of class rooms with different size area.

Table 2.2: Standard Size Area for Classroom (NUT, 2016)

	Recommended Size Area (m^2) per No. of Students		
Type of Classroom	**For 20**	**For 25**	**For 30**
Standard classroom	43	51	60
Science laboratory KS3/4		77	90
Sixth form science laboratory	90	105	
General art room KS3/4		77	90
Large art room (textiles or 3D)		90	105
Sixth form art room	77	90	
Textiles room	85		
Graphic products	85		
Electronics and control systems	90		
Resistant materials	112		
Resistant materials/engineering	116		
Food room	101		
Music classroom		57	67
Drama studio/music recital room		77	90

- **Standard corridor, hallway and door dimensions**

  According to the architect's designers of the Life Times Homes in the UK, the movement of the disabled should be adequately enhanced and convenient to assists the disabled on the wheel chair, walking assistant or any type of mobility aid. For hallway widths, the minimum width of the walkway or corridor should be 90 cm. To allow free movement and mobility Figure 2.10 explains the required dimensions of the suitable door implementation for school as Figure 2.11 illustrates the accessibility of wheel chair.

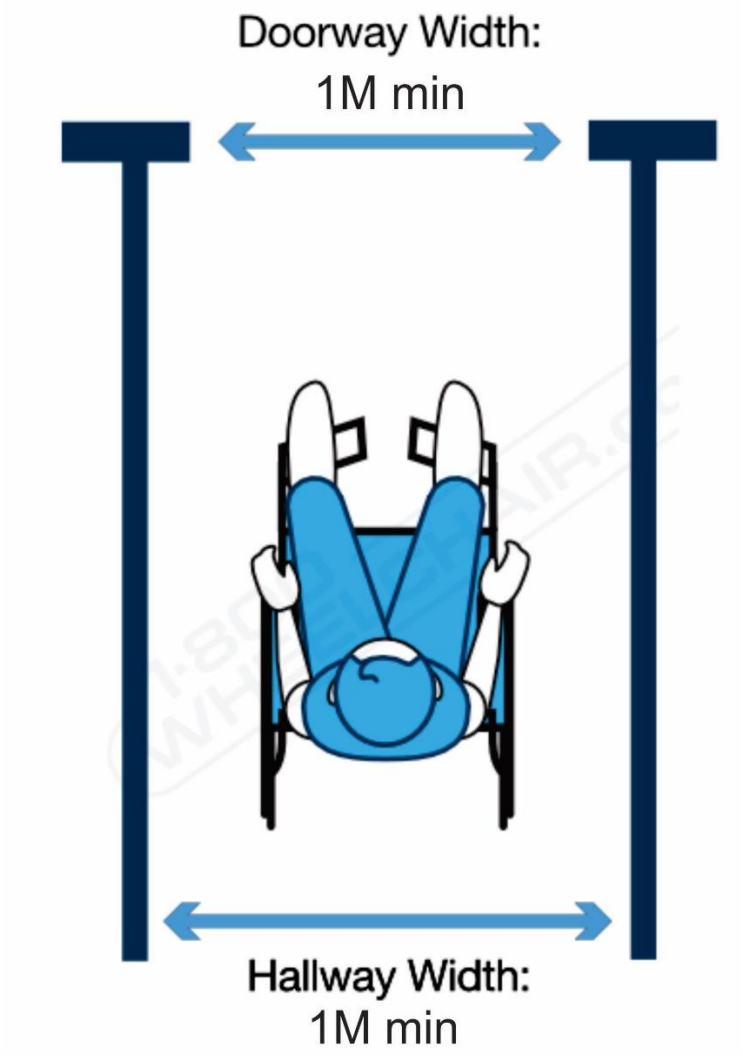


Figure 2.10: Wheel chair entrance requirements (Accessed from homedesignersuite.co)

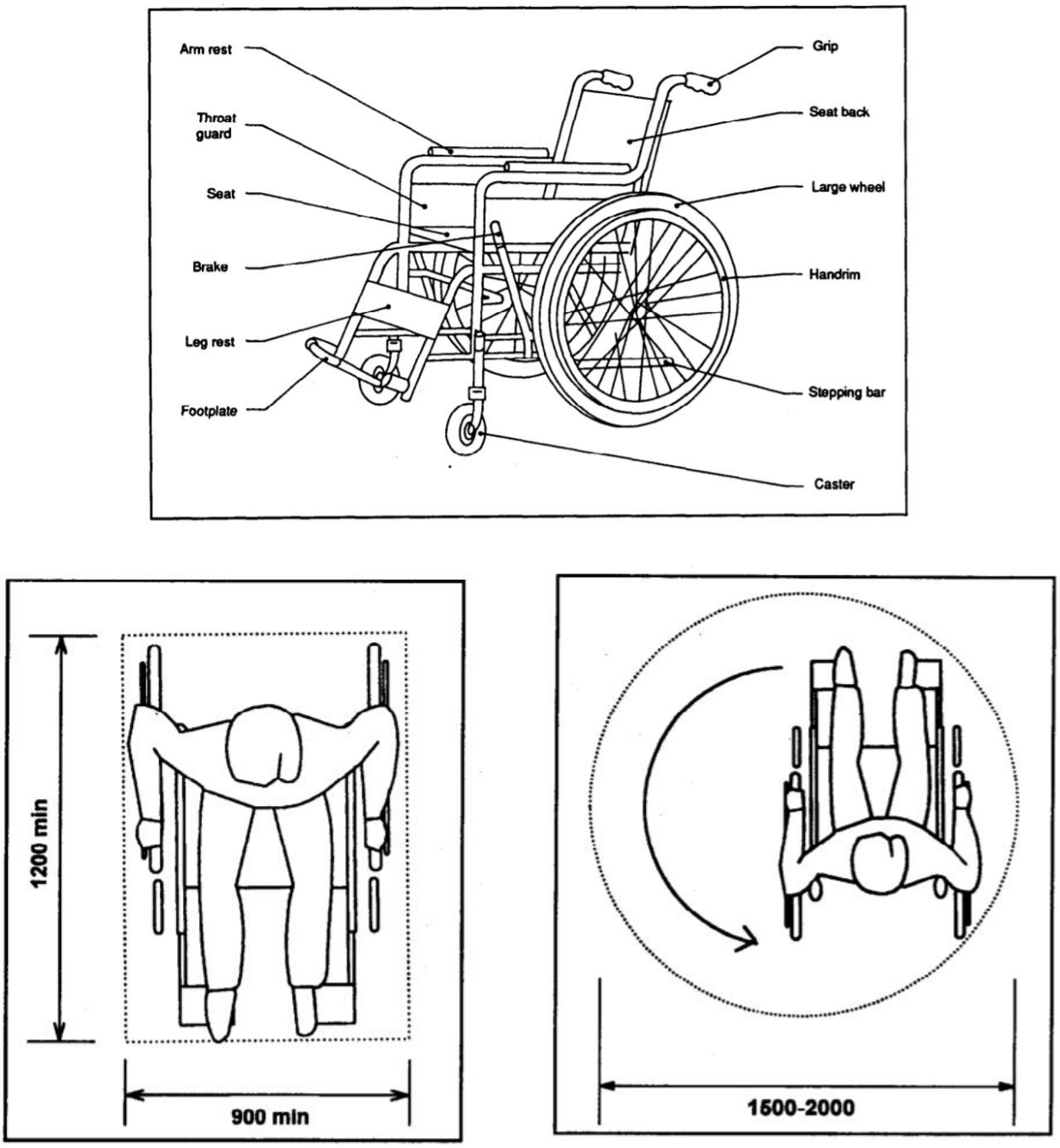


Figure 2.11: Standard wheel chair dimension with turning space (sizes in mm) (Verbeek P, 2010)

- **Standard toilet dimensions**

According to Wash room cubicle, 2010; The standard toilet sizes varies with the different size of the of the WC. Following the Building Regulations and Equality Law, there are four types of toilet's WC thus;

1. Enlarged WC: This ensures the provision of a larger WC in a set of more than one WCs. The chosen enlarges WC should be a min of 1200mm in width with the door opening outward.
2. Standard WC: All standard toilet must ensure a diameter of 450 mm at its minimum with emergency alarm and exist provisions.
3. Ambulant Disabled: If there would be only one WC present for public use, then it must be accessible for all students including the disabled students.
4. Wheel chair Accessible WC: Enhanced the accessibility of the disabled with length of the cubicle being 2220 mm as opposed the normal size of 2000 mm in its minimum.

Figure 2.12 shows the descriptive size and dimension requirement of the elaborated sizes and dimension.

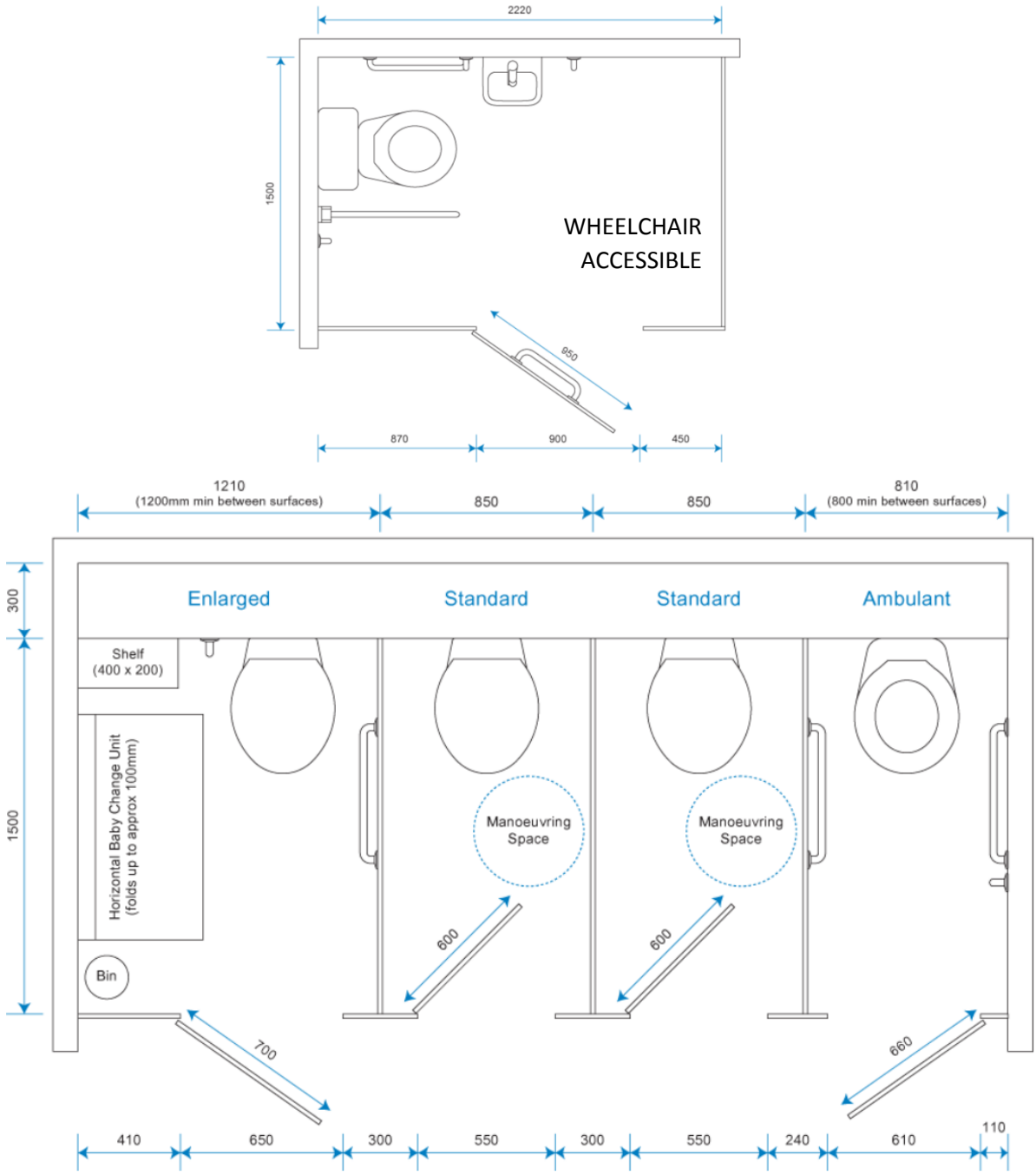


Figure 2.12: Wheel chair accessible toilet dimensions (Wash Room Cubicle, 2010)

- **Standard measurements of a wheelchair ramp**

The table 2.3 shows the basic requirements of the design of a wheel chair ramp design with measurements in inches.

Table 2.3: Basic requirements of a wheelchair ramp design (ADA, 2010).

PROPERTY	REQUIRMENT in Meters
Maximum Slope for Hand Propelling	0.025M for rise in 0.3M length.
Slope for power chairs	0.038M rise for 0.3M length
Minimum width	0.91M
Inside rails	1.22M
Level of platform	0.13M x 0.13M
Hand rails	1:12
Stopping Distance	0.13M

- **Standard measurements of ramps**

The standard dimensions for Ramps is given considering the size and dimension of the wheel chair, Figure 2.13 shows the size and dimension of the wheel chair ramps according to mimarlarodasi.org.

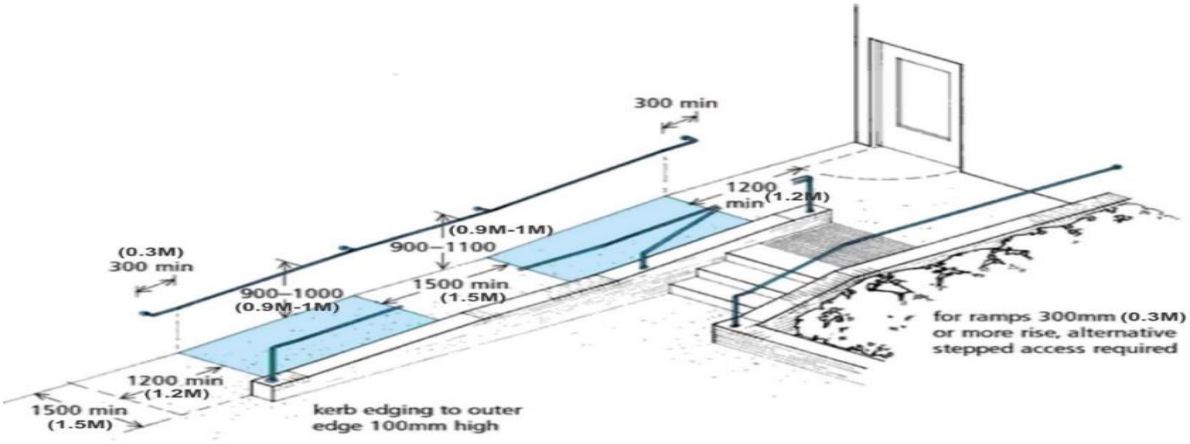


Figure 2.13: Minimum dimension for ramp construction (ADA, 2015)

- **Measurements of stairs standard**

According to Martine Oullete (2015), the height of the steps has a direct relationship with the height of each of the stairs as seen in Table 2.4.

Table 2.4: Measurement of Stairs (Winance, M 2006)

DIMENSIONS		DEPT		
No. of Steps	Height	0 Landing	24 Landing	48 Landing
1	0.18M	0.3M	0.6M	1.2M
2	0. 36M	0.6M	0.9M	1.5M
3	0.533M	0.9M	1.2M	1.8M
4	0.71M	1.2M	1.5M	2.1M
5	0.89M	1.5M	1.8M	2.4M
6	1.07M	1.8M	2.1M	2.7M

- **Standard measurements of elevator**

With regards to the disabled public, the American Disability Act (ADA) 2015 regulation, the table 2.5 summarizes the minimum dimensions both in millimeters and inches for the implementation of an elevator design.

Table 2.5: Standard size measurements of an elevator (ADA, 2015)

Door Location	**Door Clear Width**	**Inside (Side to Side)**	**Inside (Back wall to Front)**	**Inside (Back to Inside)**
Centered	1.065M	2.030M	1.295M	1.37M
Side	0.915M	1.725M	1.29M	1.37M
Any	0.915M	1.37M	2.03M	2.03M
Any	0.91M	1.52M	1.52M	1.52M

2.9 Importance of accessibility in building

Most of the researchers argue that disabled people are largely excluded from the spaces for work, recreation, consumption and circulation, forming the public places of cities (Rivono-Fisher, 2004). This allows a social-economic relationship between the disabled population and the others (Useh et al., 2001). In addition, the use of public hall for events, festival and others should enable the accessibility of all population. It is highly essential to address the issue of accessibility of all people (see Figure 2.14). School busses, railway stations should ensure the sign and posters to cater for the assistance of a person with child, a person with stick, a wheel chair user, an elderly person, or a mother with an infant (Harnik, 2003).

Figure 2.14: The Architect and the accessible city (Begon, 2015)

The prize-winning essay image in Figure 2.14 demonstrate simple the daily struggles of the disabled. It depicts what they go through day in day out trying to get around school buildings, offices, hotels etc. (Arch Daily).

2.10 Management Responsibilities of Architectural Design

There should be management policies and procedures which are very important in ensuring a universally accessible built environment most especially for the disabled.

Even the most accessible premises of the school building, can quickly become inaccessible if precautions are not maintained, for example, boxes are left in circulation routes, or fittings and fixtures could serve as obstruction for the disabled.

2.11 Architectural Design Awareness

Following the architectural plan of the design that favors the disabled high school students, there should be an awareness to this to inform the public about it. The details of how to raise awareness is further discussed:

Provide information on accessibility: Explaining the implemented architectural design on accessibility to staff, students, and their parents should allow the understanding of the needs of the disabled students. For example, parking spaces in school, signs a poster in school building would ensure a greater awareness for the architectural design.

Give accessibility details on school website: The school webpage should also carry information regarding the safety of the architectural design of the school environment for the students for easy information to the public

The fixation of accessible routes for the disabled is not enough, the continuous maintenance of the routes is also a major significance. Accessibility should be a key consideration when routine maintenance is being carried out, as it often presents an opportunity to improve the accessibility of a building. For example, when handrails are being painted, the students of the school who are disabled could understand this the colour selected should ensure good visual contrast between the handrail and the wall. For a good maintenance practice, the following should be ensured;

1. The cleaning of the path to the high school buildings.
2. All obstructions should be removed
3. All toilet and its surrounding must be clean for all usage
4. Clear and visible sigh and posters must be placed in the school surrounding

2.12 Other Relevant Studies

Evcil, 2009 examined the obstacles encountered by wheelchair users when accessing to public structures. 26 public structures were studied in details and data were gathered from Useh, Moyo and Munyongo instruments and questionnaire from direct observations and measurements. The regulation of the instruments and the wheelchair accessibility were described using descriptive statistics. The results show that in most urbanized cities of developing countries, the wheelchair users encounter several problems to access the public environs. The public transport system was found to be the biggest structural obstacle with 25% lowest mean compliance. And entrance to buildings shows a mean compliance of 79%. Also, it was seen that when construction duration is studied there is an objective to progress the access way for the disabled (Evcil, 2009).

Useh et al., (2001) assessed 20 public places in the central business district of Harare, Zimbabwe were in order to detect the obstacles and difficulty face by wheelchair users in accessing into these buildings. The accessibility of the wheelchair to the surveyed structures was determined by descriptive statistic of simple percentages and means in regulation to the rules of the instrument. From the survey, the result shows that the elevators have the highest percentage of accessibility with 89%, parking lots with 18%, ramps with 39%, entrances with 71% and toilets accessibility is 51%. The lowest percentage of the surveyed result, that is parking lots and ramps can be due to lack of consultation of disabled persons and experts in physical ability management during the construction of the buildings. While the highest percentages of the result can be a coincident, because they may be part of the building design and construction not for the purpose of the disabled. In order to solve this accessibility problems, there should be a contact between the disabled and the several professionals related to the construction of these buildings such as the architects, physiotherapists, engineers, occupational therapists and politicians. It was concluded that this problem is a great challenge to the above-mentioned professionals and it was recommended that wheelchair access to buildings should be increased Useh et al., (2001)

In UAE, the accessibility of disabled persons into public building in Al Ain was assessed by (Rivano and Fisher, 2004). 17 buildings were selected and local telephone book was used to source the data. The survey covers 8 accessible areas which includes parking lots, ramps, entrances, toilets, phone booths, accessible routes and water fountains. 79 items were surveyed

based on ADAG (Americans with Disabilities Act Guidelines). All the surveyed buildings did not record 100% compliance. Only 73% and 13% was the maximum and minimum compliance score respectively. It would have been very difficult for a wheelchair user to if he had stopped by any of the public sites surveyed in the city of Al Ain. Results showed that, in UAE, the solutions to the problems encountered by wheelchair users have been achieved even with the absence of legislature. The study sets an example of how the modern environment grows in a non-regulated circumstance, requiring the lawmakers to protect and provide the wheelchair users access to these buildings (Rivano, 2004).

Thapar et al., (2004) carried out a comparative study on public structures access for disabled and non-disabled people. It is a study of cross-sectional pilot with survey design. A team of 4 representatives of different types of disabled persons, where 30 buildings in the Greater Boston were examined. The access was determined by the use of a task-oriented instrument to gather data, in terms of distance, percentage of activity carried out, barriers and time. Generally, activity performance was tough for the team. Nevertheless, 81% was recorded as the least task for wheelchair user compared to 100% control and the lame and blind persons records 97-98%. The time and distance to finish the activities varies a little in mean values. The lame persons, both wheelchair and non-wheelchair users, reported some encountered obstacles, the blind persons and again the wheelchair persons are the highest facilitators. The facilitators and least obstacle were recorded. The types of obstacle and facilitators differ for all the disabled person. Functional access cannot be predicted by the activity performance itself. For disabled persons, facilitators and obstacles are very hard to understand in matters concerning functional access. For developing an environmentally friendly analysis, it is important to understand the obstacles faced by different disabled persons (Thapar et al., 2004).

Yarfi et al., 2017 carried out a study on 84 public structures which includes; health facilities, sports and recreation, banks, ministries, departments and agencies, educational facilities and houses were studied in order to assess their accessibilities to wheelchair users in Kumasi metropolis according to Ghanaian Disability Law (Act 716, 2006). Entrances to washrooms, ATMs, toilets, routes, height of steps, ramp grades were analyses and calculated. 40.5% of the buildings, 52.3% of entrances and 87.4% of the routes give access to wheelchair users. And 25%

of the buildings with multi-storey, have elevators to access to the floors. The study showed that commercial buildings in Kumasi metropolis does not have access to wheelchair users. It was observed that there is a target to renovate or construct buildings with access to the disabled. However, there are no guiding principle on exactly how wheelchair users will find it easy to access these buildings (Varela et al, 2010).

Welage & Liu (2011) studied the accessibility of wheelchair in commercial buildings and the role of expert in this field was discussed. 12 studies with regards to accessibility of wheelchair in commercial buildings were chosen out of the 85 major recognized journals. The accessibility of wheelchair compliance rate in different places was summarized. Even with the application of current rules and regulations, out of the chosen literatures, none reported 100% accessibility of wheelchair. Among the services related to accessibility, entrances and parking lots has the highest and least compliance rate respectively. There is need for total assessment of new and old structures with regards to the accessibility of wheelchair. Experts in this field has a significant role in encouraging access to wheelchair users in commercial buildings likewise, helping them to fully take part in all activities in all areas.

In Ibadan, Nigeria, Hamzat & Dada (2005) examined the accessibility of wheelchair in some selected public places. 38 public buildings which include; hospitals, ministries and agencies, social and recreation centers, housing and education buildings were assessed. The ramps grade, routes width, height of step and width of doorway were measured and calculated. An abridged form of the ADAAG (Americans with Disabilities Act Accessibility Guidelines) was used in defining the accessibility of the above-mentioned buildings. Wheelchair accessibility recorded 45.1% for the entrances and 19.4% for the routes. Hospitals which has 66.7% has the highest accessibility, whereas, social and recreation centers are not accessible. The study showed that accessibility of wheelchair is very low in public places of Ibadan, Nigeria, which is a key parameter that can restrict the wheelchair users to take part in the community activities.

In Jackson's, (2018) paper, it was discussed that environmental experts must have a direct contact with disabled persons in order to increase the level of knowledge on accessibility for these people which will enhance quality at community to the extent that existing structures without accessibility is needed.

Plessis, (2015) carried out his thesis research on the examination on access to social security in the situation of access for disabled persons in South Africa, with possible collaborations and points of contact of having the knowledge of disability that highlight its social likelihood and jurisprudential arguments on essential equality. In line with the analysis of the arguments in the area of the study of disability a well as how these application in the scope of employment regulation. While social knowledge of disability only focusses on structural modifications that would give these disabled persons who have the ability and zeal to work the access to such work, it was brought to conclusion that, the positive responsibilities obligated on establishments in terms of rights and employment equity, regulations are restricted.

Sanford et al., (1997) carried out a study according to ADAAG in evaluating the usage of ramp by disabled persons. 371 persons of different ages with different disabilities crossed a 30ft ramp which varies in its slope from 1:8 – 1:2. The rate of stoppage, location of stops travel rate, energy lost and distance travelled were recorded. Results show that's among these persons, only the wheelchair users find it difficult to cross over the ramp. It was concluded that the amendments of the ramp requirements cannot be currently recommended.

Danso et al., (2011) carried out an exploratory research to determine the scope of access to Persons with Disabilities (PWDs) in monumental public structures in Ghana. A feasibility study was carried out on some chosen buildings according to specifications. Results show that AICC (Accra International Conference Center) and NT (National Theater) which are recently constructed structures does not meet the guidelines for international buildings instrument, nevertheless, not completely difficult to access for the disabled. Ramps, corridors, parking lots, staircases and main entrances are not easily accessible by the PWDs. Likewise, signs such as braille texts, directions sign, phone booth access, seats for wheelchair users and underfoot warnings were not found in these buildings. Authorized guidelines for the establishment of access for PWDs in Ghana must be applied by experts and Accra Metropolitan Authority. Therefore, urgent action must be taken in instituting the provision of access for PWDs in the capital city of Accra. It was concluded that the study will help in understanding the knowledge of access for disabled persons. 13 public structures were surveyed for wheelchair users' access in Utica, New York. The structures are both governmental and non-governmental buildings. The

scale used was according to the 1971 provision of ANSI (American National Standards Institute). The structures surveyed includes those constructed before and after the enforcing the Architectural Barriers Act 1968 subjected to different types of code of practice regarding accessibility. Results show a tendency of enhancing accessibility for both the governmental and non-governmental structures, with the most accessible structure constructed in 1980. There is no any facility that have 10% compliance according to the specifications (Martin, 1987).

CHAPTER 3

ARCHITECTURAL DESIGN FOR THE DISABLED STUDENTS

This section looks at different elements of different high school building environment, thereby, providing a means to improve the architectural design for the Libyan school's high school.

3.1 Architectural Design of Accessible Route

Accessible routes to school for the disabled high school students should be put into consideration. The implementation of architectural system must support the impaired students of the high school. Students who are visually impaired and cannot see the movement of cars very well should be remembered when implementing the motor roads into architectural design. People with other difficulties should also be put into consideration by architects. Architects should place somewhat of a "pick up" center in the school surrounding to easy accessibility of the disabled students to be picked up by their parents or guardian. This parking spaces should also ensure a roofing system at the school bus junctions that permits the disabled student's accessibility. The high school building entrance constructed by the Michael Mohan Architects (Figure 3.1) is highly wide and accessible allowing all routes to it. The outside building is constructed in a way which is widely spacious allowing free and accessible movement of the disabled. Wheelchair users can use the step entrance without any difficulties. Thereby allowing all students to be able move around the school without any problem.

Implementation of architectural design of accessible route

The Libyan construction company and their architects should take an example from Michael Mohan outside building construction the when designing for accessibility in schools. Also, there are further consideration which should be keep in mind, this includes:

- There should be the consideration of the high school students who are on crotches when designing the floors and the choice of materials
- Architects should bear in mind the wheelchair users, who would require extra space when passing through routes or turning

- The people with vision loss should be put in to consideration when constructing walls and when choosing colour paint of material.
- The architects and engineers should consider the students who suffer from autistic spectrum disorders thereby having difficulties in their sensory organ and nerves. Therefore should prefer a predictably, spacious, structured school environment.
- It should be noted that students who emotional, behavioral or social difficulties would require extra space for them to feel more comfortable around school environment.
- The high school design should also allow spacious outdoor environment for playground, social and other recreational school activities.

In the construction of playground or any external space of the school surrounding, it is strongly recommended that the space given must be wide enough bearing in mind the dimensions of the disabled students wheelchair dimension and other standard measurements. It is important to consider the students with wheelchairs, walking frames with hearing or vison loss during the architectural design of the outside playground environment. The choice of material for the construction should also be safe and readily friendly to the disabled. After the implementation of the architectural design, for a long-lasting structure, the management staff should allocate appropriate staff for the monitoring. The responsibility of such staff would include; Outside management staff such as the gate keeper or security must ensure that the designated accessible parking spots are identified and are tagged for easy recognition between others.

1. Monitors the outside to allow free and accessible routes making sure that there is no blockage of road in and around the school environment.
2. Locked or parked bicycle or motor bicycle do not obstruct the main route
3. All fallen leaves, dirt, around the school building routes must be disposed.
4. Ensuring that there is moderate light both in and out of the high school environment.
5. All external posters, signs and others that doesn't relate to the safety of the disabled students of the school must be properly maintained.

Figure 3.1: High school entrance for the disabled (Zumthor, P, 2010)

Architectural dimension and plan for accessible route

In an attempt to improve the architectural plan for the disabled Libyan students, standard dimensions of design need to be put in to consideration. Accessible route consists of the implementation of ramps, railings and handrails, corridors and the likes with respect to the easy accessibility of the disabled students. The typical standard dimension of a wheelchair is shown in Figure 2.11 on page 22 with respective turning spaces. The size, weight, width, length and turning point should be considered for the implementation of architectural design for the disabled students in Libya. Furthermore, the government, civil engineers, and others in related field is advised to implement features of easily accessible route for the students of Libya. A larger percentage of the disabled Libyan students have disability in the leg, for this reason a detailed and focus illustration on wheel chair, crotches, with their standard dimension and access required spaces area is further explained. Libyan students with difficulties of walking, or finding route to the classroom should be considered in the architectural plan of school corridors, hallway and

other required infrastructure of the school buildings. For specific architectural design that requires height, weight, and width dimension such as the opening of doors, arms stretching to reach security alarm systems and other "special" required system as illustrated in the sketches. The use of Crotches by the Libyan students should also be put in to consideration during the construction of school building. Movement around school buildings, corridors, should allow the passage of all students bearing in mind of the sizes and dimension of the disabled students' measurement.

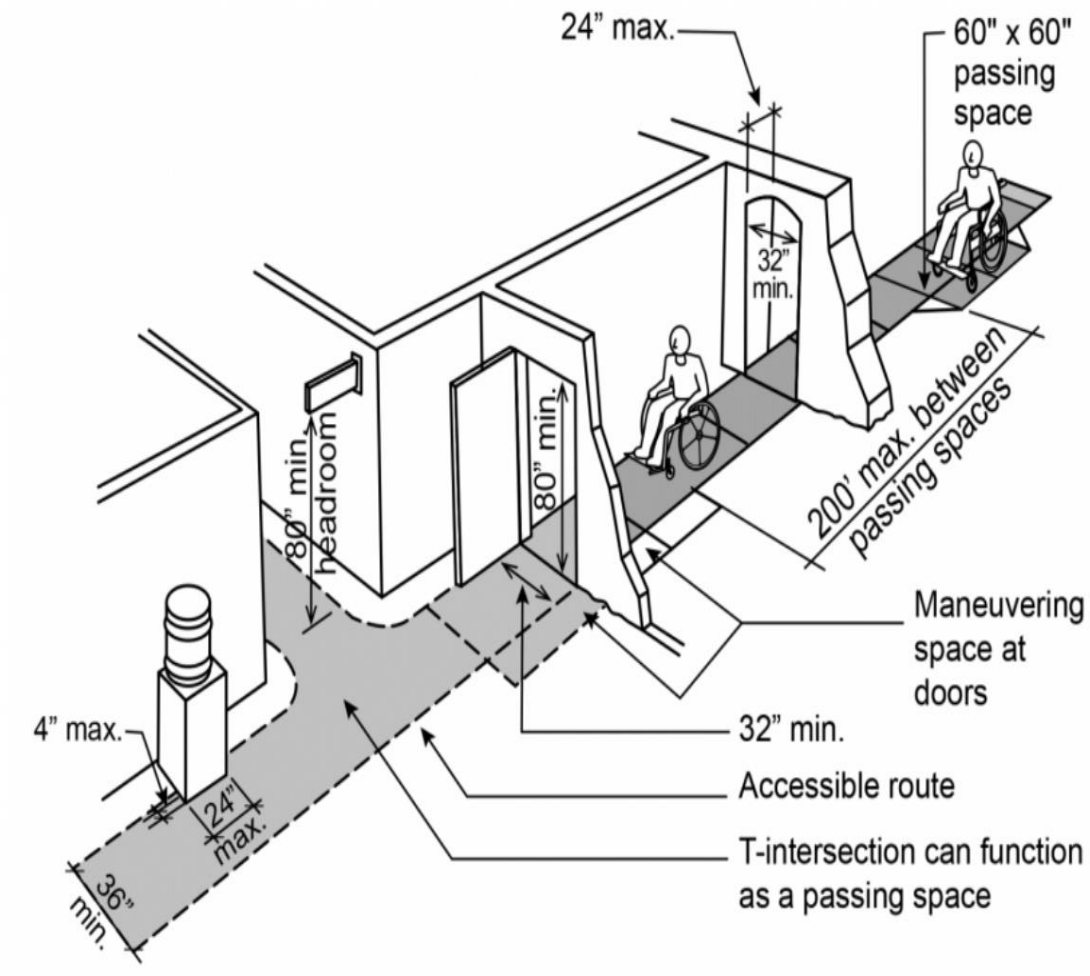


Figure 3.2: Features of an accessible route for class room (sizes in inches) (Rivano D, 2004)

3.2 Architectural Design of School Entrance

The school entrance is usually easily in front of the main school building. Its architectural design should allow it to be easily identifiable by its design structure, location and lighting. During the survey carried out in ten (10) schools' 30 percent of Libyan students complained about their school gate and how it doesn't assist their condition in anyway. Listed are other means of improving the condition of the entrance of school environment for the disable.

Implementation of school entrance architectural design for the disabled

Wide automated sliding doors are advice as most of the disabled high school students complained about the difficulties of opening and closing entrance door. This automatic door should however require little energy and should be cost effect. If possible, manual doors should be removed totally in the architectural design and construction as this door requires energy and forces to open. Revolving doors should totally be avoided as this type of doors is not suitable for the wheelchair user. There should be enough air circulation to reduce congestion for the students who are cluster phobic. There should be a good linkage from the main entrance to the classrooms, toilets, teacher's offices. An alarm or control system that is reachable by disabled students is also desired. Appropriate signs for directions desired in the architectural design.

Figure 3.3: Wide entrance architectural design for high school (McClain, 2016)

Figure 3.4: Automated entrance system (Michael Mohan , 2018)

The use of an automated entrance system for the architectural design of Libyan students would allow easier accessibility for all students. However proper maintenance of this system must be ensured. This includes the following;

1. The Libyan school authority should ensure that there is a regular servicing of all automated system (elevators, lifts, slide doors, etc.).
2. The service maintenance system of all automated system must be inline with the manufacturers' recommendations.
3. When there is any problem the school technician should fix as soon as possible.
4. Libyan school building contractors or developers should.

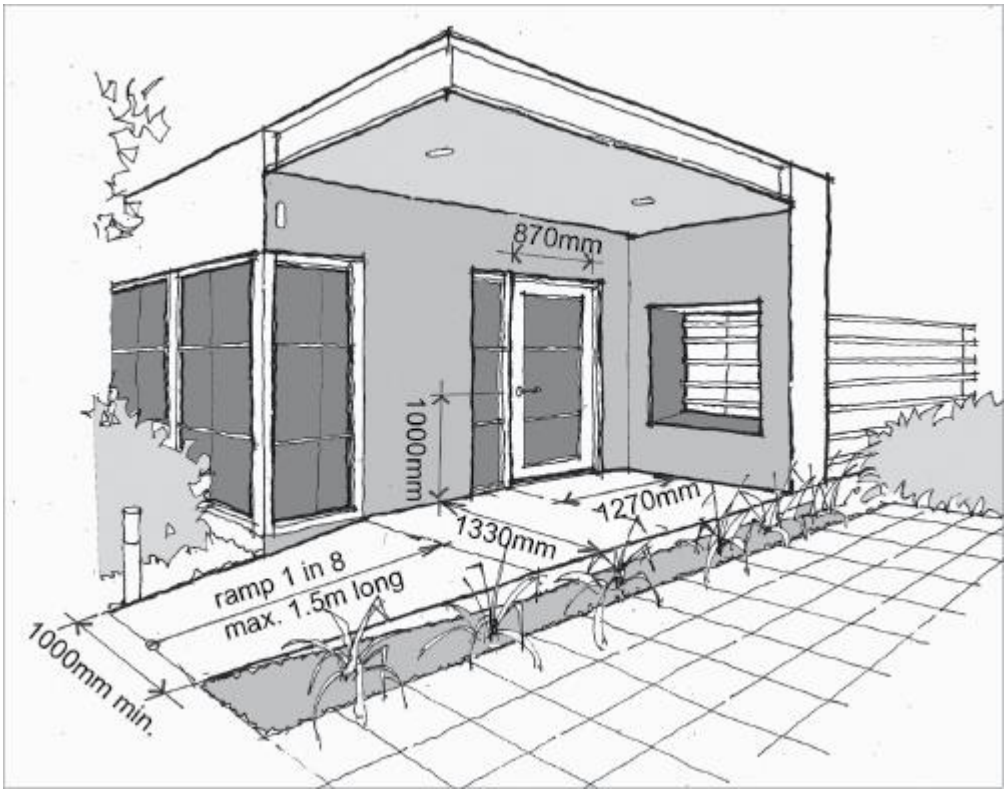


Figure 3.5: Architectural dimension of school entrance (Noe, 2017)

For the construction of corridors that connects entrance with office spaces, classroom and the rest, architects should put in consideration of the handicap Libyan students in their construction. The implementation or design of sharp corners must not be too tight for the passage of students.

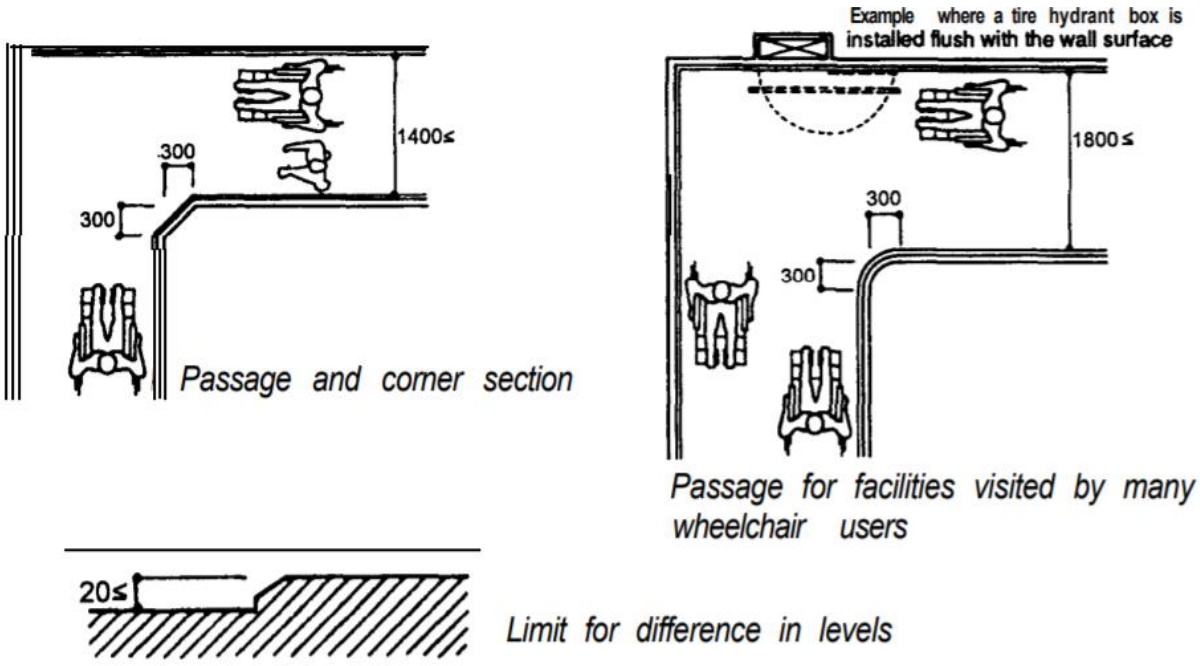


Figure 3.6: School entrance corridor plan (Noe, 2017)

Wide spacious corridors with bright colors should be used for accessibility of other type of disables of Libyan students such as the optically impaired students. Strong colors help the students with autistic disorder, contrasting colors as shown in the figure below would allow easy identification of doors and roots for Libyan students with vision loss. The routes should also be wide enough to allow all students passage.

Figure 3.7: Corridor of school building (Michael Mohan, 2015)

3.3 Architectural Design for School Toilet

As there are students with variety of disability as illustrated in the previous chapter, several consideration factors should be put in place for all types of disabilities in the architectural design of toilet for the disabled students. The minimum requirement standard for the architectural design of the disabled would require large space of cubicles with rails that are grabbable for easy access of the handicap. The standard public toilet for students should allow all access to door handles, cubicle handles, free movement in the toilet. Generally, accessible toilets for school building construction can be improved for Libyan students. A school in Ireland provides toilets within the classroom to allow easy access for students. Others schools in Europe has adopted the method of placing toilet facilities adjacent to the toilet room.

Toilet standard architectural design for the disabled

Libya due to its culture may require privacy for the male and female students. Nevertheless, the implementation of toilet facilities for the disabled should allow easy access for all students. According to the US Access Board, there is a standard advisory dimension for students in inches shown in the following table.

Figure 3.8: Toilet facility for the disabled (Michael Mohan, 2015)

The standard toilet facility for the disabled students can be adopted for the school construction in Libya as shown above. Asides students, disabled teachers or elders can also have access to these facilities. Importantly is the maintenance of the toilet facility in which the school management board should ensure proper and regularly cleaning and maintenance of the toilet facility.

Table 3.1: Standard dimension requirement for disabled toilet, in in inches (US access's board, 2008)

Ages	12-18 Years
WC	0.5M
Toilet Seat Height	0.48M
Grab Bar Height	0.7M
Dispenser Height	0.5M

Toilet standard architectural plan for the disabled

The architectural plan of the disabled students on the Libyan schools can be implemented or improve by adopting the US standard dimension. The following figures depicts a standard toilet architectural plan for disabled.

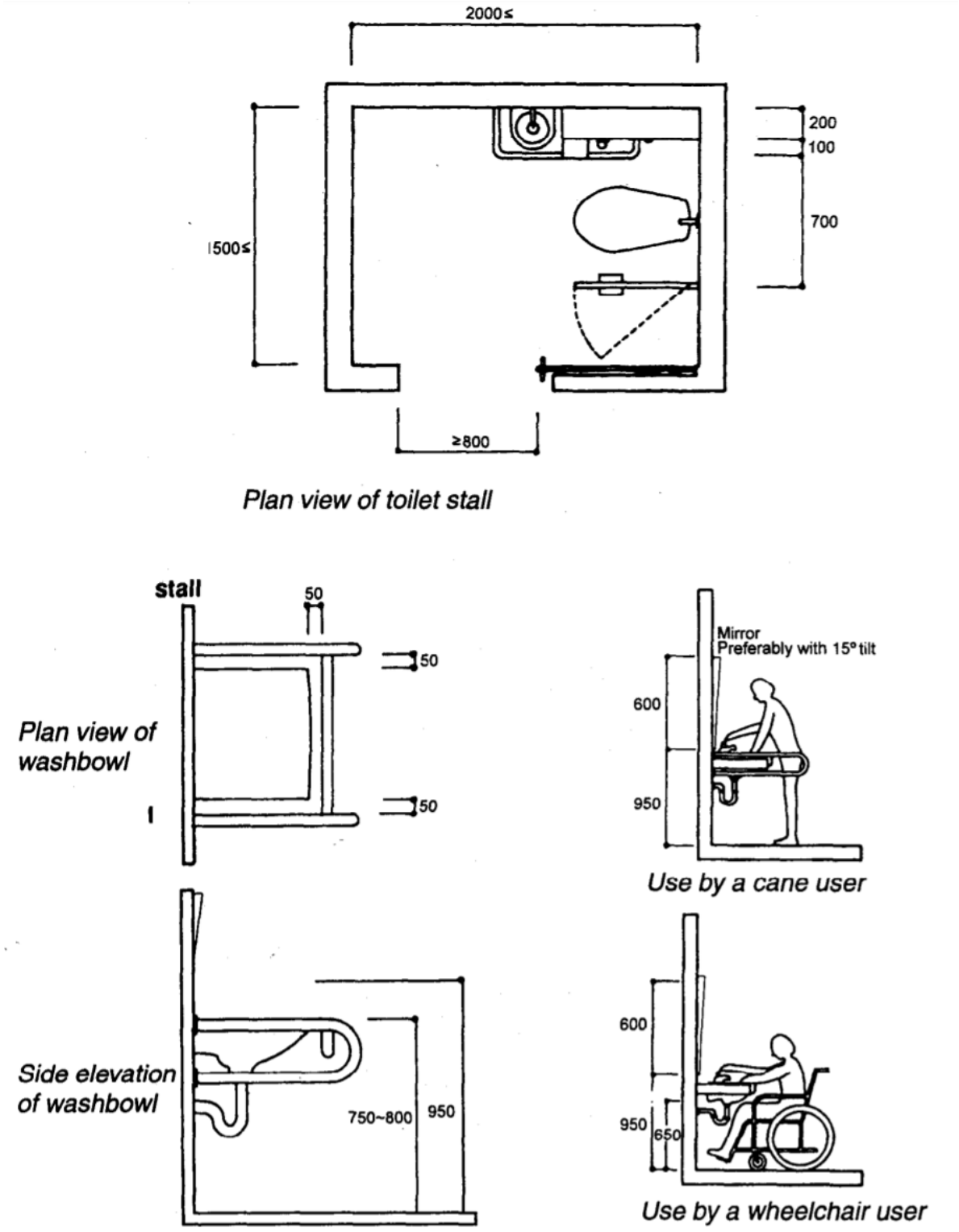


Figure 3.9: Toilet architectural plan (British Standards Institution, 2001)

3.4 Other Architectural Design for the Disabled

Other facility that should consider the disabled in the construction of school building for improving the standard of the Libyan schools would include the implementation of the following with respect to international guidelines and standard;

1. Counters
2. Drinking Fountains
3. Telephone boot access
4. Class Room Accessibility
5. Posters and signs
6. Mail Box
7. Cafeteria
8. Playground
9. School halls (Event and Sport hall)
10. Emergency Exit
11. Laboratories
12. Computer rooms
13. Hostel

The consideration of the blind students, the deaf, the amputee and other form of physically disability or disorder in general should be put in to consideration for the architectural design of all aspects of architectural space of a school building plan. The Libyan education law and enforcement is advised to pass law to all architectural board, civil engineers to ensure the basic requirement of a disabled included school.

The schematic diagram illustrates the significant of dimension of these other significant construction properties for the architectural design of a school building.

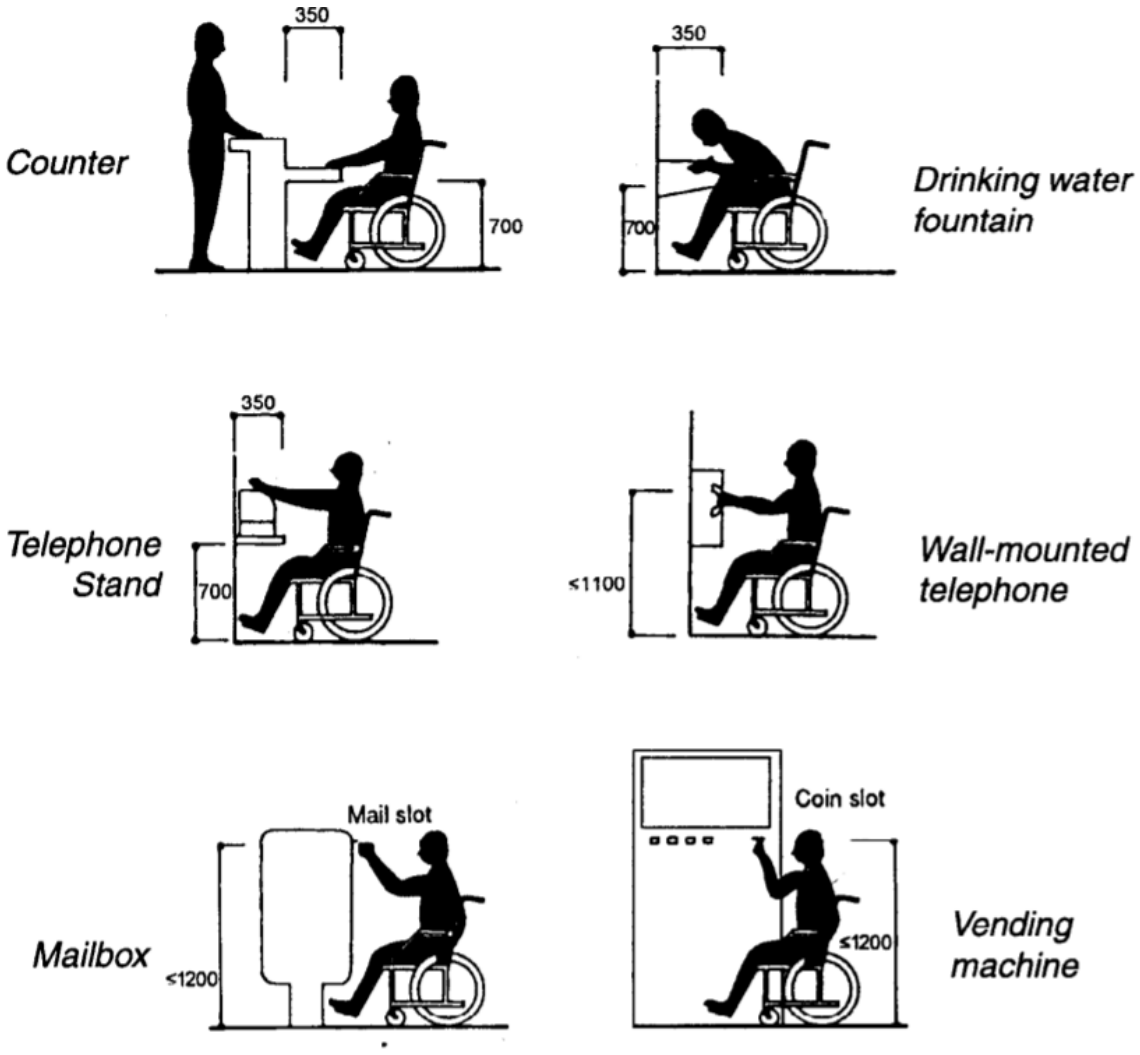


Figure 3.10: Architectural Dimension Plan (CPWD, 2008)

3.4.1 Architectural design of classroom

Architectural spaces, lightening condition, color paint selection should be selected in respect of the disabled students. Student would be hearing aids would require minimal noise environment to hear properly in the classroom. Mores, the student with impaired vision would require good lighting to prospect eyes from total blindness. Students who would require to see sign language or read lips during classes would also require perfect position usually in the front row of the class to allow easily accessible learning condition.

Figure 3.11: Classroom design for the disabled (Sheldon School, 2011)

3.4.2 Architectural design of parks and playground

Outside school environment such as parks and event areas should involve architectural design that caters for the needs of all students

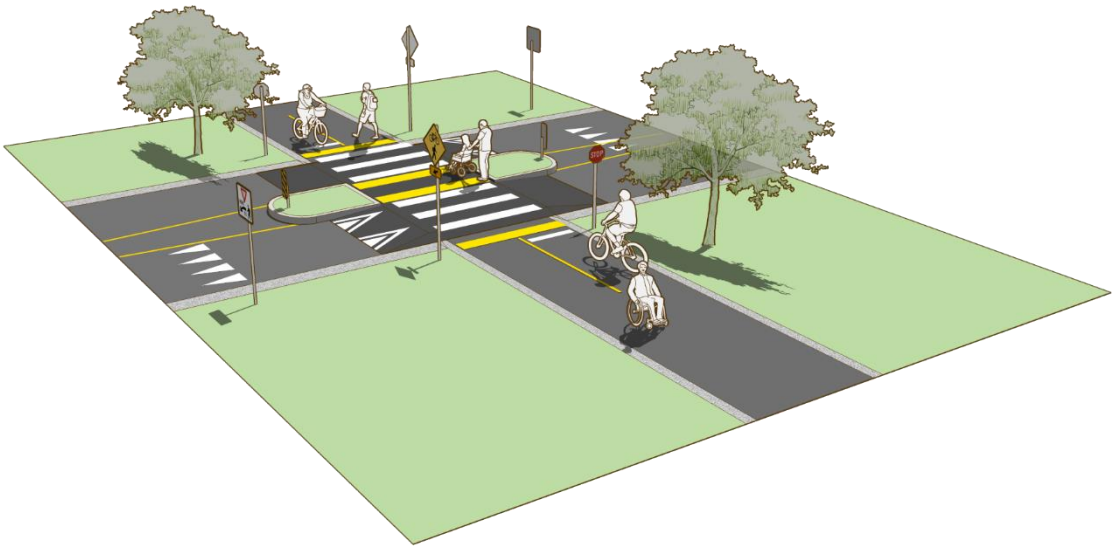


Figure 3.12: Outside school environmental plan (Groth C, 2014)

3.4.3 Signs and posters

Adequate signs and posters should be placed where necessary in and out of the school environment.

SIGNAGE	TYPE	SIGNAGE	TYPE	SIGNAGE	TYPE
	DISABLE		ROOM NO./ INFORMATION HOLDER ADA BRAILLE		RESERVED PARKING
	WOMEN REST ROOM		DISABLE DRIVER		PLEASE LEAVE 2MTS.
	FAMILY REST ROOM		IN CASE OF FIRE FOR ELEVATOR		MEN REST ROOM
	HOSPITAL WAITING WITH BRAILLE		DISABLE PARKING		NO SMOKING

Figure 3.13: Signs and posters for the disable (American National Standard Institute, 2009)

3.4.4 Architectural design of drinking fountains

Drinking of water is highly necessary for all students as its increases the concentration of the students in the classroom. The architectural design of drinking fountains should be inclined with the height of students. Also, the knee space, wheel chair space, crotches space should be put in to consideration with appropriate standard dimension for the implementation or improvement of the Libyan schools.

Figure 3.14: Drinking fountains (Imrie R, 2003)

CHAPTER 4

EVALUATION ARCHITECTURAL DESIGN FOR THE DISABLED STUDENTS IN LIBYAN HIGH SCHOOLS

This chapter focus on the appropriateness of architectural designs of high schools in Libya for the disabled students Research and findings for 10 Libyan high schools are discussed in this chapter. Furthermore, questionnaire is done among the students of these schools and results are evaluated.

4.1 Survey Methods

Survey was carried out in 10 high schools in Libya to understand the requirements of the disabled high school students in Libya. Libya is formally known as the State of Libya. It is a sovereign state located in Northern Africa at Maghreb local region. Its geographical location is such that towards its north we have the Mediterranean, its East is occupied by Egypt, Sudan facing the south east while Algeria and Tunisia are west to Libya. Tripolitania, Fezzan, and Cyrenaica are the major districts of Libya. Libya is known worldwide for its oil demonstrating the tenth biggest oil store all over the planet.

Figure 4.1: Libya on Map (https://www.googlemap.com/search?dkdfaaag)

Ten high schools were selected randomly in Downtown city in Libya for the study. The high schools are listed below;

- **SCHOOL 1: AL-HARATI HIGH SCHOOL;** Address of School: Tripoli Street, Al-Khums, Libya; Location (Longitude & Latitude): 32.65^{o}N, 14.26^{o}E
- **SCHOOL 2: JABER BIN HAYYAN GIRLS SCHOOL;** Address of School: Twenty Street, Al-Khums, Libya; Location (Longitude & Latitude): 32.65^{o}N, 14.26^{o}E
- **SCHOOL 3: SHUHADAA LIBYA SCHOOL;** Address of School: Lipda District, Al-Kums, Libya; Location (Longitude & Latitude): 32.64^{o}N, 14.28^{o}E
- **SCHOOL 4: KHADIJA GRAND SCHOOL;** Address of School: Lipda District, Al-Khums, Libya; Location (Longitude & Latitude): 32.64^{o}N, 14.27^{o}E
- **SCHOOL 5: AL-HAFIR HIGH SCHOOL;** Address of School: Al-Sahel District, Al-Khums, Libya. Location (Longitude & Latitude): 32.62^{o}N, 14.32^{o}E
- **SCHOOL 6: AL-SHAIMAA SECONDARY SCHOOL;** Address of School: Tahrir Street, Zliten, Libya; Location (Longitude & Latitude): 32.47^{o}N, 14.57^{o}E
- **SCHOOL 7: KORTOBA GIRLS SCHOOL;** Address of School: Zliten, Kadosh-Al-Shaib Road, Zliten, Libya; Location (Longitude & Latitude): 32.44^{o}N, 14.55^{o}E
- **SCHOOL 8: FATIMA AL-ZAHRA SCHOOL;** Address of School: Al-Riyadiya Street, Al-Khums, Libya; Location (Longitude & Latitude): 32.65^{o}N, 14.26^{o}E
- **SCHOOL 9: UMM-AL-QURA SCHOOL;** Address of School: Dhahirah Street, Zliten, Libya; Location (Longitude & Latitude): 32.40^{o}N, 14.62^{o}E
- **SCHOOL 10: AL-NAJAH SCHOOL;** Address of School: Al-Riyadiya Street, Al-Khums, Libya; Location (Longitude & Latitude): 32.65^{o}N, 14.26^{o}E

To begin the questionnaire, the interviewer asked major questions to begin the interview with the disabled high school students in the mentioned schools.

1. How many students are disabled in the school?
2. What are the types of deformities experienced in the school?
3. How many teachers in each of the high school understands the "special" needs of the disabled students?
4. What are the special needs of the disabled students?

Special Architectural design requirement to suit the high school building was also discussed. Following the interview is the introduction of the designed questionnaire for a more structed response. Where the questionnaire asked about several question such as the type of disability of the student, the type of assistant the school systems renders for the student during daily school activities and during the examination period. The details of questionnaire can be found in the appendix page. At the end of the discussion and interview in each school, the school administration was thanked and the data was recorded and later discussed.

4.2 Survey Response of Questionnaire

Following up on the questionnaire from the respondents in the visited schools in Libya, the following results was analyzed. Questionnaire can be seen on appendix 1.

Six questions have been asked to 35 students from different schools. The following questions are asked for them.

- What is your disability?
- Do you need special assistance for travelling to the campus? If yes, how is it arranged?
- Do you need special arrangements when attending lectures?
- Do you need assistance or special equipment in your studies and in completing course assignments?
- Do you envisage any activities in your study program that you cannot attend, such as field trips, laboratory work, e.t.c
- Do you need special arrangements for examination?

Responses are given below:

The pie chart represents the percentage of the different type of disability randomly collected and recorded from the high school in Libya.

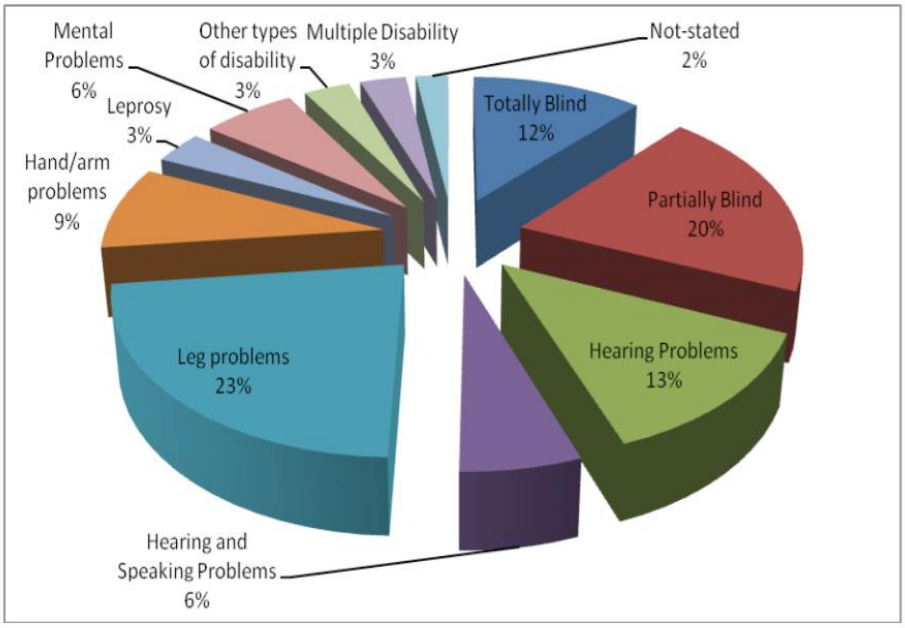


Figure 4.2: Distribution of the disabled Libyan high school students in percentages.

A total number of 35 students participated in the questionnaire survey from all schools where the majority of the students marked physical disability as the form of disability. Students on wheel chair and other form of leg disabilities explained that the school prefects of the schools assist them in climbing the stairs in entering of the school.

An average of 35 students explained that the Libyan school government does not provide any special assistance to the disabled students of the school asides for the provision of few numbers of "special teachers" who understands how to treat disabled students.

33 students out of 35 whom filled the questionnaire elaborated that they do not need any form of special assistance for other school activities such as field trips or laboratory.

Lastly, the condition for examination for all students is same for all students regardless of their form of disability as dictated by the Libyan government as filled by the correspondents.

Furthermore, the interview gave a broad and general understanding of the requirements of the disabled students, while the questionnaire allows for a more interactive person answer to question. The respondents participated very well in the survey giving the architects the ideal needs of the disabled. The attempt of improving and implementing these surveyed solutions are further discussed. However to make the survey more understandable, the respondents answers have been structured to charts.

Special teacher refers to the teachers who understood the needs of the disabled students. Some schools did not record any teacher who actually understands how to deal or teach the disabled students while some high school teachers show a high record of 5 teachers 3 of whom understood sign language and all of these teachers have an experience in catering for the disabled (see Figure 4.3). In the survey, the general overview of all needs of student structure-wise was discussed with parent, staffs and the Libyan high school students.

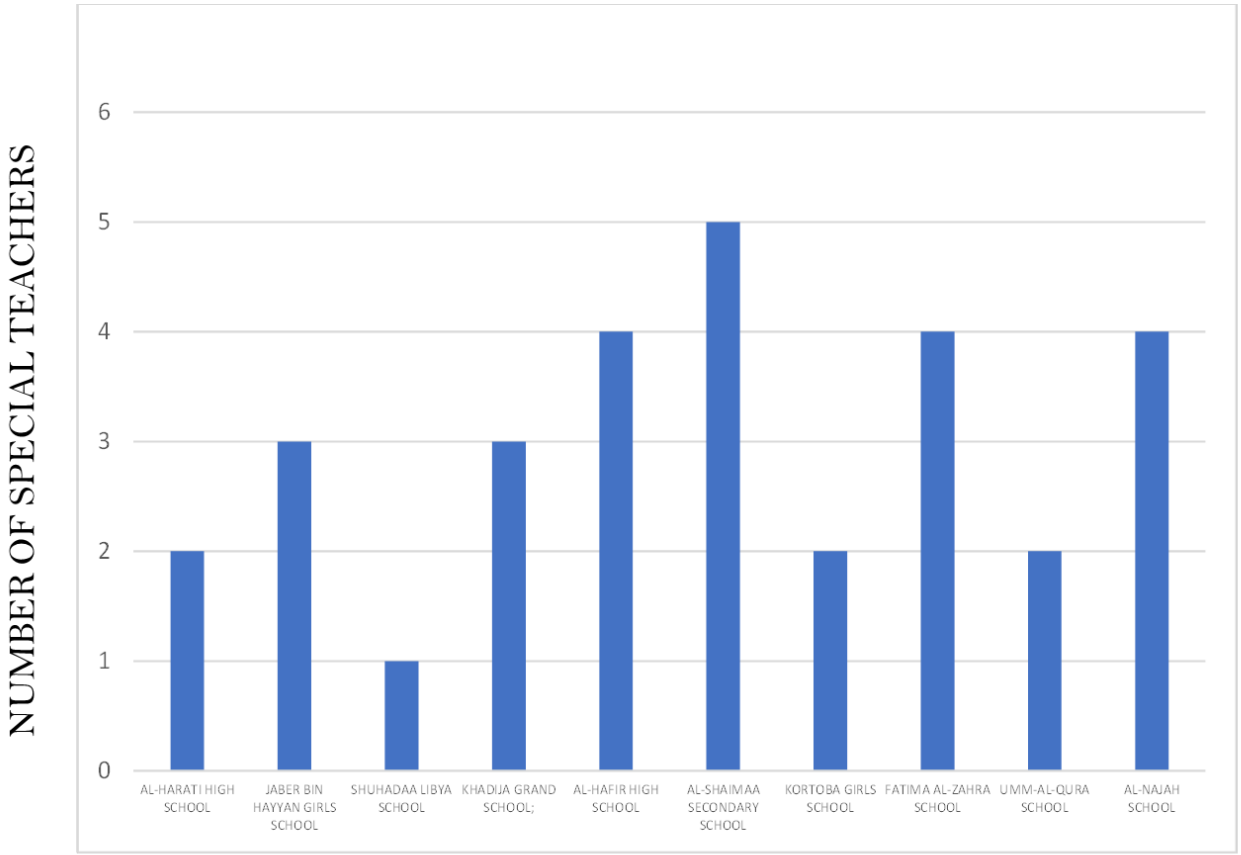


Figure 4.3: Number of "special" teachers in the Libyan high School

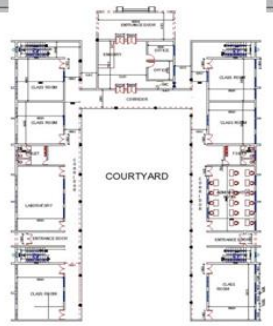
4.3 Analysis of Research

A total of ten high schools was randomly selected school in Libyan in an attempt to improve the accessibility architectural design. Several buildings were observed that needed implementation and improvement both for the disabled students and others. However, due to the ongoing situation in Libya, not all schools gave permission to obtain architecture plan and pictures, but most of the schools understood the research thesis aim and were willing to participate in the survey. Table 4.1 (A, B, C, D, E, F, G, H, I, J) was designed to encompass a detailed information obtained from visited schools such as the site plan, google plan, size dimensions and area of the sections in the school.

The total comparison of space dimensions in terms of spatial use for the disabled students among ten schools are studied in Table 4.2. An attempt of improving spatial properties of the schools are reflected with SWOT analysis at the bottom of table. In Table 4.3 recommended positions of elevators for future development are also mentioned.

Table 4.1A: Analysis of Al-Harati High School

SCHOOL 1: AL-HARATI HIGH SCHOOL
Address of School: Tripoli Street, Al-Khums, Libya
Location (Longitude & Latitude): 32.65°N, 14.26°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS	
				
Location (Longitude & Latitude): 32.65°N, 14.26°E	Land Area=19.54m² Car Bark=1450m² Sport Area=705m²	Number of floors= 3 Each floor Area=1.040 m²	Photo from Toilet	Photo from Entrance

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.5m x 6.5m
Corridor	✓	2.1m x 80m
Toilet	✓	0.9m x 1.8m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✗	
Door	✓	1.50m x 2.1m

Summary of Findings

Wide area spacious classroom with enough wheelchair space but the toilet shows no consideration for the disabled students of the school in anyway.

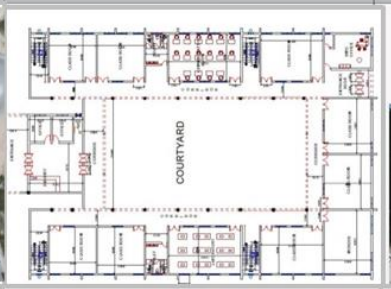
	BUILDING PROGRAM	TOTAL NO.	AREA (M²)
1	ADMINISTRATION	1	10m x 6.5m = 65m²
2	COMMON AREA	-	
	Entrance Hall	1	10.6m x 4.2m = 44.52m²
	W.C Lavatory	7	7 x 0.9 x 1.8m = 11.34m²
	Corridors	1	2.1m x 80m = 168.0m²
	Stairs	4	4 x 6.75m x 2.4m = 64.8m²
	Kitchen	1	3.6m x 3.0m = 10.8m²
	Mosque	-	
3	EDUCATION	-	
	Classrooms	6	6 x 6.5m x 6.5m = 253m²
	Laboratory	1	10.0m x 6.5m = 65m²
	Office	2	2.8m x 3.6m = 10.08m²
	TOTAL GROUND AREA	:	1040m²

Table 4.1B: Analysis of Jaber Bin Hayyan Girls School

SCHOOL 2: JABER BIN HAYYAN GIRLS SCHOOL

Address of School: Twenty Street, Al-Khums, Libya

Location (Longitude & Latitude): 32.65°N, 14.26°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS	
				
Location (Longitude & Latitude): 32.65°N, 14.26°E	Land Area=15.855 m^2 Car Bark=735 m^2 Sport Area=498 m^2	Number of floors: 2 Each floor Area=1.274 m^2	Photo from Entrance Stairs	Photo from Classroom

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.5m x 6.5m
Corridor	✓	2.1m x 85m
Toilet	✓	1m x 3.0m
Ramp	×	
Stairs	✓	0.15m rise and 0.30m run
Elevator	×	
Signage	×	
Door	✓	1.5m x 2.1m

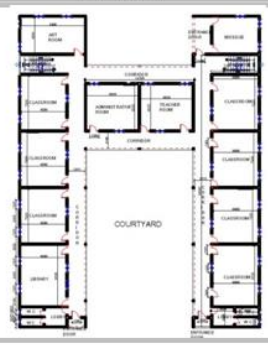
Summary of Findings

The main entrance of the school building is unaccessible to the disabled students of the school. The school principal however explained that the disabled students of the school are carried or assisted by staff in to the class room. The Entrance, toilet, hostel room, corridor shows no sign of consideration for the disabled students of the school.

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	1	10m x 6.5m = 65m^2
2	COMMON AREA	-	
	Entrance Hall	1	10.6m x 4.1m = 43.4m^2
	W.C Lavatory	7	7 x 1.2m x 2.1m = 17.2m^2
	Corridors	1	2.1m x 85m = 153m^2
	Stairs	4	4 x2.4m x 6.0m = 57.6m^2
	Kitchen	1	3.6m x 3.0m = 10.8m^2
	Mosque	1	8.8m x 6.5m = 57.2m^2
3	EDUCATION	-	
	Classrooms	8	8 x 6.5m x 6.5m = 338m^2
	Laboratory	1	6m x 9.3m = 55.8m^2
	Library	1	6.5m x 8.6m = 55.9m^2
	TOTAL GROUND AREA :		1735.0m^2

Table 4.1C: Analysis of Shuhadaa Libya School

SCHOOL 3: SHUHADAA LIBYA SCHOOL
Address of School: Lipda District, Al-Kums, Libya
Location (Longitude & Latitude): 32.64°N, 14.28°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS	
				
Location (Longitude & Latitude): 32.64°N, 14.28°E	Land Area=11.215 m² Car Bark=938 m² Sport Area=946 m²	Number of floors=1 Each floor Area=1.361 m²	Photo from Classroom	Photo from Entrance Stairs

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.5m x 6.5m
Corridor	✓	2.1m x 118m
Toilet	✓	1m x 1.5m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✗	
Door	✓	1.2m x 2.1m

Summary of Findings

The main entrance of the school building is unaccessible to the disabled students of the school.
The Entrance, toilet, hostel room, corridor shows no sign of consideration for the disabled students of the school.

	BUILDING PROGRAM	TOTAL NO.	AREA (M²)
1	ADMINISTRATION	1	10m x 6.5m = 65m²
2	COMMON AREA	-	
	Entrance Hall	1	10.6m x 4.1m = 43.5m²
	W.C Lavatory	7	7 x 1.2m x 2.4m = 20.2m²
	Corridors	1	2.1m x 118m = 126.0m²
	Stairs	4	4 x2.4m x 7.2m = 69.12m²
	Kitchen	1	3.0m x 3.6m = 10.8m²
	Mosque	-	
3	EDUCATION	-	
	Classrooms	6	6x 6.5m x 6.5m = 253.5m²
	Laboratory	1	10m x 6.5m = 65m²
	Offices	2	2.8m x 3.6m = 10.08m²
	TOTAL GROUND AREA :		1234.4m²

Table 4.1D: Analysis of Khadija Grand School

SCHOOL 4: KHADIJA GRAND SCHOOL
Address of School: Lipda District, Al-Khums, Libya
Location (Longitude & Latitude): 32.64°N, 14.27°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS
			 
Location (Longitude & Latitude): 32.64°N, 14.27°E	Land Area=11.124 m^2 Car Bark=938 m^2 Sport Area=946 m^2	Number of floors=1 Floor Area=961 m^2	Photo from corridor / Photo from Toilet

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.0m x 7.2m
Corridor	✓	2.1m x 85.4m
Toilet	✓	1.1m x 3m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✗	
Door	✓	1.20m x 2.1m

Summary of Findings

The main entrance of the school building is unaccessible to the disabled students of the school. Although the toilet and the bathroom shows little sign of accessibility for the disabled student as there are poles, hinges hunged to the wall, however, these are not of standard dimensions. The Entrance, toilet, hostel room, corridor shows no sign of consideration for the disabled students of the school.

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	2	2 x6.8m x 6m = 81.6m^2
2	COMMON AREA	-	
	Entrance Hall	4	4 x 2.1m x 1.2m = 10.1m^2
	W.C Lavatory	4	4 x 1.1m x 3.0m = 13.3m^2
	Corridors	1	2.1m x 85.4m = 179.34m^2
	Stairs	2	2 x 2.4mx6.25m = 15.0m^2
	Kitchen	1	5.0m x 3.9m = 19.5m^2
	Mosque	1	8.4m x 4.8m = 40.32m^2
3	EDUCATION	-	
	Classrooms	7	7 x 6.0m x 7.2m = 302.4m^2
	Art Room	1	8.4m x 4.8m = 40.32m^2
	Library	1	6.8m x 6m = 40.8m^2
	TOTAL GROUND AREA :		789.9m^2

Table 4.1E: Analysis of Al-Hafir High School

SCHOOL 5: AL-HAFIR HIGH SCHOOL
Address of School: Al-Sahel District, Al-Khums, Libya.
Location (Longitude & Latitude): 32.62°N, 14.32°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS
			
Location (Longitude & Latitude): 32.62°N, 14.32°E	Land Area= 6.204 m^2 Car Bark= 926 m^2 Sport Area= 760m^2	Number of floor= 3 Each floor Area= 451m^2	Photo from outside school

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.5m x 5.4m
Corridor	✓	2.4m x 46m
Toilet	✓	0.9m x 1.5m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✗	
Door	✓	1.2m x 2.1m

Summary of Findings

There are so signs and posters to create awareness of the disabled student all through the school building.
Although the toilet and the bathroom shows little sign of accessibility for the disabled student student as there are poles, hinges hunged to the wall. however, these are not of standard dimensions.
The Entrance, toilet, hostel room, corridor shows no sign of consideration for the disabled students of the school.

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	1	3.0m x 4.2m = 12.6m^2
2	COMMON AREA	-	
	Entrance Hall	1	3.3m x 3.3m = 10.89m^2
	W.C Lavatory	5	5 x 0.9x 1.5m = 6.75 m^2
	Corridors	1	2.4m x 46m = 110.4m^2
	Stairs	2	2x 5.62m x 2.4m = 27m^2
	Kitchen	1	3.00m x 3.3m = 9.9m^2
	Mosque	-	
3	EDUCATION	-	
	Classrooms	6	6 x 6.5m x 5.4m = 210.6m^2
	Offices	1	3m x 4.2m = 21.6m^2
	Library	-	
	TOTAL GROUND AREA : 504.97m^2		

Table 4.1F: Analysis of Al-Shaimaa Secondary School

SCHOOL 6: AL-SHAIMAA SECONDARY SCHOOL

Address of School: Tahrir Street, Zliten, Libya

Location (Longitude & Latitude): 32.47°N, 14.57°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS
			
Location (Longitude & Latitude): 32.47°N, 14.57°E	Land Area=10.668 m^2 Car Bark=930 m^2 Sport Area=554 m^2	Number of floor= 2 Each floor Area=1.137 m^2	Photo from playground

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.5m x 6.5m
Corridor	✓	2.1m x 82m
Toilet	✓	0.9m x 1.8m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✓	A3
Door	✓	1.20m x 2.1m

Summary of Findings

There are so signs and posters to create awareness of the physically challenge all through the school building. Although the toilet and the bathroom demonstrated no sign of accessibility for the disabled student student as there are poles, hinges hunged to the wall. however, these are not of standard dimensions.

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	1	6.5m x 9m = 58.5m^2
2	COMMON AREA	-	
	Entrance Hall	1	3.8m x 6.7m = 25.5m^2
	W.C Lavatory	6	6 x 0.9m x 1.8m = 9.7m^2
	Corridors	1	2.1m x 82m = 147.6m^2
	Stairs	4	4 x2.4m x 6.7m = 64.32m^2
	Kitchen	1	2.4m x 6.7m = 16.08m^2
	Mosque	1	4.8m x 3.4m = 16.56m^2
3	EDUCATION	-	
	Classrooms	7	7 x 6.5m x 6.5m=295.75m^2
	Laboratory	1	10m x 6.5m = 65m^2
	Library	1	8.6m x 6.5m = 55.9m^2
	TOTAL GROUND AREA : 1127.0m^2		

Table 4.1G: Analysis of Kortoba Girls School

SCHOOL 7: KORTOBA GIRLS SCHOOL
Address of School: Zliten, Radosh-Al-Shaib Road, Zliten, Libya
Location (Longitude & Latitude): 32.44°N, 14.55°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS	
				
Location (Longitude & Latitude): 32.44°N, 14.55°E	Land Area=10.029 m^2 Car Bark=573 m^2 Sport Area=316 m^2	Number of floor= 2 Each floor Area= 1.751 m^2	Photo from Entrance Stairs	Photo from Toilet

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.0m x 6.0m
Corridor	✓	2.4m x 85m
Toilet	✓	1m x 3.0m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✗	
Door	✓	1.2m x 2.1m

Summary of Findings

There are so signs and posters to create awareness of the disabled students all through the school building.
The toilet and the bathroom demonstrated no sign of accessibility for the disabled student.

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	1	6.9m x 10m = 69m^2
2	COMMON AREA	-	
	Entrance Hall	2	2 x 1.6m x 5m = 16m^2
	W.C Lavatory	8	8 x 1.0m x 3m = 24m^2
	Corridors	1	2.4m x 85m = 153m^2
	Stairs	2	2 x 2.4m x 6.2m = 14.4m^2
	Kitchen	1	3.0m x 3.0m = 9.0m^2
	Mosque	1	3.75m x 6.3m = 23.63m^2
3	EDUCATION	-	
	Classrooms	8	8x 6.0m x 6.0m = 288m^2
	Art Room	1	6m x 6.9m = 41.4m^2
	Library	1	7.5m x 6.5m = 48.75m^2
	TOTAL GROUND AREA		906.8m^2

Table 4.1H: Analysis of Fatima Al-Zahra School

SCHOOL 8: FATIMA AL-ZAHRA SCHOOL
Address of School: Al-Riyadiya Street, Al-Khums, Libya
Location (Longitude & Latitude): 32.65°N, 14.26°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS
			
Location (Longitude & Latitude): 32.65°N, 14.26°E	Land Area=12.836 m² Car Bark=1.299 m² Sport Area=890 m²	Number of floor= 1 Floor Area= 832 m²	Photo from Classroom

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6m x 6.5m
Corridor	✓	2.4m x 50m
Toilet	✓	1.2 x 1.5m
Ramp	✗	
Stairs	✓	0.15m rise and 0.30m run
Elevator	✗	
Signage	✗	
Door	✓	1.2m x 2.1m

Summary of Findings

There are so signs and posters to create awareness of the disabled all through the school building.

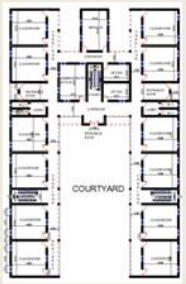
The toilet and the bathroom demonstrated no sign of accessibility for the disabled student.

The corridor are not of the standardize measurement for the disabled students

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	1	6.5m x 5.4m = 35.1m²
2	COMMON AREA	-	
	Entrance Hall	2	2 x1.5m x 2.4m = 7.2m²
	W.C Lavatory	5	5 x 1.2m x 1.5m = 9m²
	Corridors	1	2.4m x 50m = 120m²
	Stairs	2	2 x7.2m x 2.4m = 34.56m²
	Kitchen	1	4.2m x 3m = 12.6m²
	Mosque	-	
3	EDUCATION	-	
	Classrooms	6	6 x 6m x 6.5m = 234m²
	Offices	1	4.2m x 3m = 12.6m²
	Library	1	3.6m x 6.6m = 23.8m²
	TOTAL GROUND AREA:		591.6m²

Table 4.1I: Analysis of Umm-Al-Qura School

SCHOOL 9: UMM-AL-QURA SCHOOL
Address of School: Dhahirah Street, Zliten, Libya
Location (Longitude & Latitude): 32.40°N, 14.62°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS
			
Location (Longitude & Latitude): 32.40°N, 14.62°E	Land Area=7.070 m^2 Car Bark=226 m^2 Sport Area=1.112 m^2	Number of floor = 3 Each floor Area = 947 m^2	Photo from Playground

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.0m x 6.0m
Corridor	✓	1.8m x 115m
Toilet	✓	1.1m x 3m
Ramp	✗	
Stairs	✓	0.15m rise and 0.35m run
Elevator	✗	
Signage	✗	
Door	✓	1.2m x 2.1m

Summary of Findings

There are so signs and posters to create awareness of the disabled all through the school building.
The toilet and the bathroom demonstrated no sign of accessibility for the disabled student.
Asides this, the entire school seems to be lacking cleanliness and maintenance

	BUILDING PROGRAM	TOTAL NO.	AREA (M^2)
1	ADMINISTRATION	1	4.6 x 6.3m = 29m^2
2	COMMON AREA	-	
	Entrance Hall	2	2 x 6.4m x 3m = 38.4m^2
	W.C Lavatory	4	4 x 1.1m x 3m = 13.2m^2
	Corridors	1	1.8m x 115m = 149.4m^2
	Stairs	3	3 x 2.4m x 6m = 43.2m^2
	Kitchen	1	4.6m x 3m = 13.8m^2
	Mosque	1	6.9m x 4.5m = 31m^2
3	EDUCATION	-	
	Classrooms	9	9 x 6.0m x 6m = 324.2m^2
	Art Room	1	6.0 x 6.0m = 36m^2
	Library	1	6.0 x 12.3m = 73.8m^2
	TOTAL GROUND AREA:		963.4m^2

Table 4.1J: Analysis of Al-Najah School

SCHOOL 10: AL-NAJAH SCHOOL
Address of School: Al-Riyadiya Street, Al-Khums, Libya
Location (Longitude & Latitude): 32.65°N, 14.26°E

SATELLITE VIEW (GOOGLE EARTH)	SITE PLAN	PLAN	PHOTOS
			
Location (Longitude & Latitude): 32.65°N, 14.26°E	Land Area=12.446 m² Car Bark=926 m² Sport Area=715m²	Number of floor =1 Floor Area =614m²	Photo from Entrance

SPACE DIMENSIONS

	AVAILABILITY	DIMENSIONS
Classroom	✓	6.5m x 5.4m
Corridor	✓	2.4m x 46m
Toilet	✓	1.2m x 1.5m
Ramp	×	
Stairs	✓	0.15m rise and 0.30m run
Elevator	×	
Signage	×	
Door	✓	0.9m x 2.1m

Summary of Findings

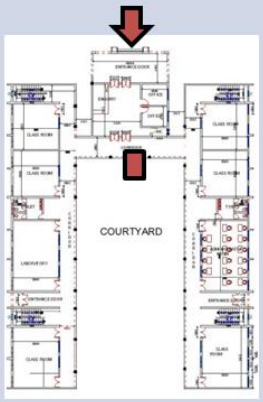
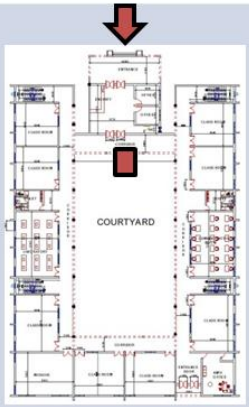
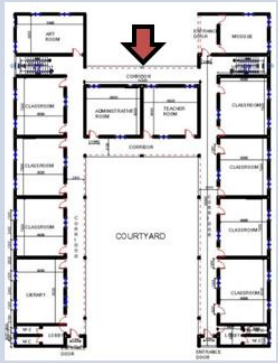
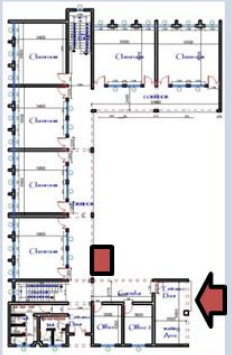
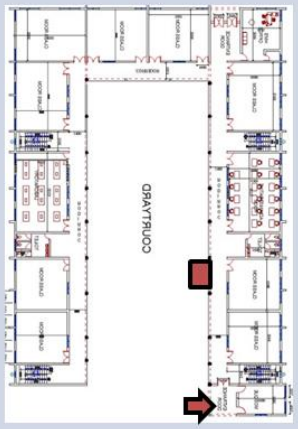
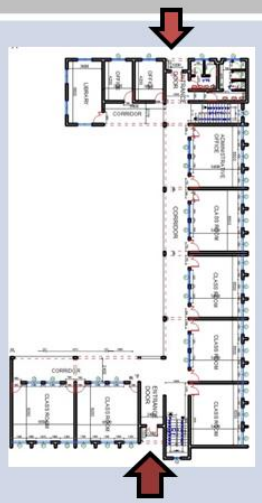
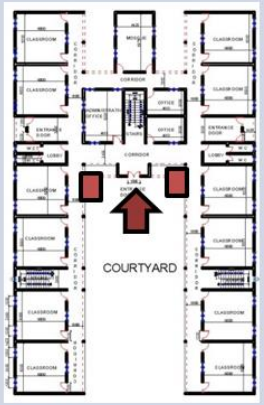
There are so signs and posters to create awareness of the physically challenge all through the school building. The toilet and the bathroom demonstrated no sign of accessibility for the physically challenged student. The school building lacks maintenance

	BUILDING PROGRAM	TOTAL NO.	AREA (M²)
1	ADMINISTRATION	1	5.4m x 6.5m = 35.1m²
2	COMMON AREA	-	
	Entrance Hall	1	3.0m x 4.4m = 13.2m²
	W.C Lavatory	5	5 x 1.2x 1.5m = 9m²
	Corridors	1	2.4m x 46m = 110.4m²
	Stairs	2	2 x 2.4m x 6.5m = 31.2m²
	Kitchen	1	4.3m x 3.0m = 12.9m²
	Mosque	1	4.2m x 6.5 = 27.3m²
3	EDUCATION	-	
	Classrooms	6	6x 6.5m x 5.4m = 210.6m²
	Art Room	-	
	Library	-	
	TOTAL GROUND AREA :		534.01m²

Table 4.2: Comparison of space dimensions in terms of disabled students in Libyan high schools

SPACE DIMENSION COMPARISON										
Building Programme	**School 1**	**School 2**	**School 3**	**School 4**	**School 5**	**School 6**	**School 7**	**School 8**	**School 9**	**School 10**
Administration	10m x 6.5m = 65m	10m x 6.5m = 65m^2	2 x6.8m x 6m = 81.6m^2	10m x 6.5m = 65m^2	3.0m x 4.2m = 12.6m^2	6.5m x 10m = 65m^2	6.9m x 10m = 69m^2	6.5m x 5.4m = 35.1m^2	4.6 x 6.3m = 29m^2	5.4m x 6.5m = 35.1m^2
Entrance Hall	10.6m x 4.2m = 44.52m^2	10.6m x 4.1m = 43.4m^2	4 x 2.1m x 1.2m = 10.1m^2	10.6m x 4.1m = 43.5m^2	3.3m x 6.6m = 21.2m^2	3.8m x 6.7m = 25.5m^2	2 x 1.6m x 5m = 16m^2	2 x1.5m x 2.4m = 7.2m^2	2 x 6.4m x 3m = 38.4m^2	2.4m x 4.4m = 10.6m^2
W.C	7 x 0.9 x 1.8m = 11.34m^2	7 x 1.2m x 2.1m = 17.2m^2	4 x 1.1m x 3.0m = 13.3m^2	7 x 1.2m x 2.4m = 20.2m^2	5 x 0.9x 1.5m = 6.75 m^2	6 x 0.9m x 1.8m = 9.7m^2	8 x 1.0m x 3m = 24m^2	5 x 1.2m x 1.5m = 9m^2	4 x 1.1m x 3m = 13.2m^2	5 x 1.2x 1.5m = 9m^2
Corridors	2.1m x 80m = 168.0m^2	2.1m x 85m = 153m^2	2.1m x 85.4m = 179.34m^2	2.1m x 118m = 126.0m^2	2.4m x 46m = 110.4m^2	2.1m x 82m = 147.6m^2	2.4m x 85m = 153m^2	2.4m x 50m = 120m^2	1.8m x 115m = 149.4m^2	2.4m x 46m = 110.4m^2
Stairs	4 x 6.75m x 2.4m = 64.8m^2	4 x2.4m x 6.0m = 57.6m^2	2 x 2.4mx6.25m = 15.0m^2	3.0m x 3.6m = 10.8m^2	2x 5.62m x 2.4m = 27m^2	4 x2.4m x 6.7m = 64.32m^2	2 x 2.4m x 6.2m = 14.4m^2	2 x7.2m x 2.4m = 34.56m^2	3 x 2.4m x 6m = 43.2m^2	2 x 2.4m x 6.5m = 31.2m^2
Kitchen	3.6m x 3.0m = 10.8m^2	3.6m x 3.0m = 10.8m^2	5.0m x 3.0m = 15m^2	3.0m x 3.6m = 10.8m^2	3.00m x 3.3m = 9.9m^2	2.4m x 6.7m = 16.08m^2	3.0m x 3.0m = 9.0m^2	4.2m x 3m = 12.6m^2	4.6m x 3m = 13.8m^2	5.0m x 3.0m = 15.0m^2
Mosque	—	8.8m x 6.5m = 57.2m^2	8.4m x 4.8m = 40.32m^2	4 x2.4m x 7.2m = 69.12m^2	—	3.6m x 5.9m = 16.56m^2	3.75m x 6.3m = 23.63m^2	—	6.9m x 4.5m = 31m^2	4.2m x 6.5 = 27.3m^2
Classroom	6 x 6.5m x 6.5m = 253m^2	8 x 6.5m x 6.5m = 338m^2	7 x 6.0m x 7.2m = 302.4m^2	6x 6.5m x 6.5m = 253.5m^2	6 x 6.5m x 5.4m = 210.6m^2	8 x 6.5m x 6.5m = 338m^2	8x 6.0m x 6.0m = 288m^2	6 x 6m x 6.5m = 234m^2	11 x 6.0m x 6m = 396m^2	6x 6.5m x 5.4m = 210.6m^2
Laboratory & Art Room	10.0m x 6.5m = 65m^2	6m x 9.3m = 55.8m^2	8.4m x 4.8m = 40.32m^2	10m x 6.5m = 65m^2	2 x 3m x 3.6m = 21.6m^2	10m x 6.5m = 65m^2	6m x 6.9m = 41.4m^2	6 x 4.2m x 3m = 75.6m^2	6.0 x 6.0m = 36m^2	—
Library	2 x 3.6m x 3m = 21.6m^2	6.5m x 8.6m = 55.9m^2	6.8m x 6m = 40.8m^2	2 x3.0m x 3.6m = 21.6m^2	—	—	7.5m x 6.5m = 48.75m^2	3.6m x 6.6m = 23.8m^2	—	—
SWOT ANALYSIS OF LIBYAN HIGH SCHOOL										
STRENGHT	Large sport area with Laboratory and art Room	Enclose school Building thereby guaranteeing safety	Wide Administration Hall also used as an Event hall	Spacious Carpark separated from Football field	Classroom space dimension is large enough for standards	Wide entrance for students of standard dimensions	Larger school building space available for further development	Space area allocated for sport activities is large enough	There is a larger classroom space area	The staircase is small thereby limited in usage
WEAKNESS	No mosque, or event hall for the students of the school	The space allocated for the school is relatively small	The toilet space in the school building is limited	The size of the kitchen is very small when compared to standard	Total area is limited in space for further school development	Non automated Entrance	Kitchen Space provided is limited in space	The space of the school building is very small	The administrative building is small in terms of standard	Library and art room space is very small in space
OPPORTUNITIES	Laboratory is large for the installation of equipment	There is a wide space area provided for the classroom	Large mosque area used for Islamic Lectures and event	Standard Laboratory provision with larger space area.	Nearby Land area is available to improve on the structure	Large space area for Ramps and Elevators	Space allocated for art room is of standard dimension	The corridor can be enhanced to standard dimensions	Wide spacious playground space also used as event hall	Wide central mosque used as venue for events and lectures
THREATS	The sport area is the same as the pitch and car park.	There is limited structural space for further school development	The provided entrance hall is small in space and sizes	The school requires staircase and ramp implementation	The school requires a larger building construction	Space allocated for art room is not of standard dimension	The parking space is small in size	Toilet space area is very small and it not of standard dimension	Library infrastructure is very small in space	The toilet is small in space, thereby not of standard.

Table 4.3: Recommended positions of elevators for future development

SCHOOL 1: AL-HARATI HIGH SCHOOL	SCHOOL 2: JABER BIN HAYYAN GIRLS SCHOOL	SCHOOL 3: SHUHADAA LIBYA SCHOOL	SCHOOL 4: KHADIJA GRAND SCHOOL	SCHOOL 5: AL-HAFIR HIGH SCHOOL
				
SCHOOL 6: AL-SHAIMAA SECONDARY SCHOOL	**SCHOOL 7: KORTOBA GIRLS SCHOOL**	**SCHOOL 8: FATIMA AL-ZAHRA SCHOOL**	**SCHOOL 9: UMM-AL-QURA SCHOOL**	**SCHOOL 10: AL-NAJAH SCHOOL**
				

CHAPTER 5

CONCLUSION AND RECOMMENDATIONS

The thesis aimed to explain the different types of disable condition that exist in Libyan school in an attempt to improve the architectural condition of the school building construction. General introduction of the thesis with aims and objectives of the research survey was explained in the first chapter of the thesis. Literature review has been done in chapter two and three, basicly reflecting worldwide architectural spatial standarts for disabled. After identifying the physically students' requirements in terms of architectural design, detailed descriptions of several illustrations of implemented architectural applications in school buildings are mentioned.

Chapter four of the thesis describes the method of survey which comprises interview and questionnaire carried out with the disabled students of randomly selected students in Libya high schools. The result of the needed architectural design was drawn out from the both the interview session and the questionnaire of the correspondents.

The interview revealed with some students (three to seven students) in every school and also with teachers and managers. According to the interview, most schools lack ramps and elevators, as well as toilets that are considered unsuitable for students with disabilities. In addition, students with disabilities need to be able to understand and help them to meet their special needs of eating, drinking and moving within the school

The survey of three high schools involved 35 students, where the majority of students identified physical disability as a form of disability. Students in a wheelchair and other forms of leg disabilities explained that some teachers and friends at school helped them climb the stairs when they entered school. On average, 35 students showed that the Libyan school government does not provide any special assistance to students with disabilities in school with regard to providing a few "special teachers" who understand how to deal with students with disabilities. 33 of the 35 students who completed the questionnaire in detail stated that they did not need any form of special assistance for other school activities such as field trips or laboratories. Finally, the requirement of examination for all students is the same for all students regardless of the form of disability dictated by the Libyan government and has been filled by reporters.

Through the evaluation of building programs of ten selected high schools in Libya the following results can be given in terms of SWOT analysis;

- Strengths: Most schools have a large sports area, and most classrooms are almost suitable for standard dimensions.
- Weakness: According to toilets and kitchens in most schools, there is a limited and non-standard area for students with disabilities. In all schools there are no elevators or ramps, causing problems for students with special needs, in addition to the toilets are not suitable for them.
- Opportunities: Most schools have a large fields giving them the opportunity to develop extensions so that they become more suitable for the disabled.
- Threats: Spatial requirements of disabled students are not considered seriously in most of the schools by designers. Lack of financial support also limits to develop architectural needs in schools.

The studied schools in this thesis, like most of the schools in the world have got L-shape, U-shape or closed courtyard type architectural plans. These types of plans give great opportunity for meeting the needs of disabled students in terms of constructing elavators for vertical circulation. For this purpose, several positons of elevators are recommended for future development. It must also be mentioned that governments of Libya must enforce the laws for architectural standarts of disabled people, particularly in public buildings and spaces. These design standards already are not only for disabled but also for everyone (old people, people carrying suitcases etc.) and improve the quality of life in the country.

References

Accessibility in Public Accommodations". 581: Readily Achievable Checklist. ADA Compliance Guide, USA, Thompson Publishing Group, December 1991. pp. 113-119.

ADA Standards for Accessible Design 2010; printed as Appendix A of the title III regulation in the Code of Federal Regulations.

Adaptive Environments Center, Inc. and Barrier Free Environments, Inc., "The Americans with Disabilities Act Checklist for Readibly Achievable Barrier Removal." USA, 31 March 1992. 12 pages.

Adaptive Environments Center, Inc., *Access Boston*. Boston Redevelopment Authority, 1990. 42 pages.

American National Standards Institute (ANSI). 1961. A117.1 Accessible and Usable Buildings and Facilities. Washington: American National Standards Institute.

American National Standards Institute. *American National Standard for Buildings and Facilities: Providing Accessibility and Usability for Physically Handicapped People*. New York, 2009. 84 pages.

Americans with Disabilities Act Accessibility Guidelines (ADAAG) (2004). http://www.accessboard. gov/adaag/html/adaa.htm [Accessed April 24, 2018].

Ariffin Mohd Seng Yeap Kong, Naziaty Mohd Yaacob, Ati Rosemary 2016 Constructing a Mixed Methods Research Design: Exploration of an Architectural Intervention First Published June 8, Research Article https://doi.org/10.1177/1558689816651807

Ariffin, Affifah. 2016. Existing Buildings to Meet New Accessibility Requirements from 2017. Channel News Asia.

Australian Building Codes Board (ABCB). 2017. Available online: http://www.abcb.gov.au/Connect/Articles/ 2017/11/Celebrating-21-years-of-the-performance-base-code (accessed on 29 November 2017).

Beckman, Mats. *Building for Everyone*. Stockholm, Ministry of Housing and Physical Planning, 1976. 108 pages.

Begon, J. What are Adaptive Preferences? Exclusion and Disability in the Capability Approach: What are Adaptive Preferences? J. Appl. Philos. 2015, 32, 241–257. [CrossRef]

Blackman T, Mithchell L, Burton E, Jenks M, Parsons M, Raman S, Willians K. The accessibility of public spaces for people with dementia: A new priority for the open city. Disabil

Bordas Eddy, M. Conservation/Tranformation; Kealy, L., Musso, S., Eds.; Workshop in Conservation; EAAE: Leuven, Belgium, 2011; ISBN 978-2-930301-50-1.

Bordas Eddy, M. Let'sOpen Cities for Us—LOCUS; Iniciativa Digital Politècnica, Universitat Politècnica de Catalunya: Barcelona, Spain, 2013; ISBN 978-84-7653-976-7.

Bordas Eddy, M. Universal Accessibility: On the Need of an Empathy-Based Architecture. Ph.D. Thesis, School of Architecture, Housing Design, Tampere University of Technology, Tampere, Finland, 2017.

Bordas Eddy, M.; García Soler, S.; Vidal Wagner, C.; Usandizaga Calparsoro, M.; Pérez Liebergesell, N. Four Wheelchair User Architects; Pérez Liebergesell, N., Ed.; Iniciativa Digital Politècnica, Universitat Politècnica de Catalunya and Gustavo Gili: Barcelona, Spain, 2017; ISBN 978-84-252-2982-4.

Bovens, L. Sour Grapes and Character Planning. J. Philos. 1992, 89, [CrossRef]

Boys, J. Doing Disability Differently. Available online: https://www.architectural-review.com/rethink/ doing-disability-differently/8668802.article (accessed on 24 October 2017).

Braddock, David L., and Susan L. Parish. 2001. Chapter 2: An Institutional History of Disability. In Handbook of Disability Studies, 2nd ed. Edited by Gary L. Albrecht, Seelman K and Michael Bury. Thousand Oaks: Sage Publications. [CrossRef]

British Standards Institution (2001). Design of buildings and their approaches to meet the needs of disabled people, BS 8300, London, 168 pp.

Bruce, Anna. 2014. Which Entitlements and for Whom? The Convention on the Rights of Persons with Disabilities and Its Ideological Antecedents. Ph.D. thesis, Lund University, Lund, Sweden.

Bruckner, D.W. In defense of adaptive preferences. Philos. Stud. 2009, 142, 307–324. [CrossRef] 51. Barnes, E. Disability and Adaptive Preference. Philos.

Butler, R.; Bowlby, S. Bodies and Spaces: An Exploration of Disabled People's Experiences of Public Space. Environ. Plan. Soc. Space 1997, 15, 411–433. [CrossRef]

Central Coordinating Committee for the Promotion of Accessibility for the Disabled (CCPT). *Accessibility of Buildings and the Outdoor Environment*. Delft, Dutch Standard Institute, 1988. 67 pages.

Cervinkova, H. Disability and the other in cultural anthropology. Hum. Mosaic 1996, 30, 56–

Commonwealth of Australia. 2018. Rights of People with Disability. Available online: https://www.ag.gov.au/

Corbusier, L. The Decorative Art of Today; MIT Press: Cambridge, MA, USA, 1987; ISBN 978-0-262-62055-0.

Corker, M.; Shakespeare, T. Disability/Postmodernity: Embodying Disability Theory; Bloomsbury Academic: New York, NY, USA, 2002; ISBN 978-0-8264-5055-5.

Cusick, A., & El Sahly, R. M. H. (2018). People with Disability in Libya are a Medicalised Minority: Findings of a Scoping Review. *Scandinavian Journal of Disability Research*, *20*(1).

Damasio, A. Descartes' Error: Emotion, Reason and the Human Brain; Random House: New York, NY, USA, 2008; ISBN 978-1-4070-7206-7.

Dansk Ingeniørforning (Danish Engineering Association) *Planning of Open Spaces as regards Access for Disabled People*. Translated by Eva Eriksen, Copenhagen, Forlag Normstyrelsen Publicationer, 1984. 51 pages.

Danso Anthony K., Frances E. Owusu-Ansah, Divine Alorwu Designed to deter: Barriers to facilities at secondary schools in Ghana Afr J Disabil. 2012; 1(1): 2. Published online 2012 May 16. doi: 10.4102/ajod.v1i1.2

Denmark. Ministry of Housing, Circular No.49 of 23 MARCH 1972. 6 pages.

Devlieger, P.; Renders, F.; Froyen, H.; Wildiers, K. Blindness and the Multi-Sensorial City; Garant: Antwerp, Belgium, 2006; ISBN 978-90-441-1739-4.

Dierckx de Casterlé, B.; Gastmans, C.; Bryon, E.; Denier, Y. QUAGOL: A guide for qualitative data analysis. Int. J. Nurs. Stud. 2012, 360–371. [CrossRef] [PubMed] Multimodal Technologies and Interact. 2018, 2, 4 17 of 17

Elster, J. Sour Grapes: Studies in the Subversion of Rationality; Cambridge University Press: New York, NY, USA, 2016; ISBN 978-1-107-14202-2.

Evcil, A.N., (2009). Wheelchair Accessibility to Public Building in Istanbul, Disability and

Rehabilitation: Assistive Technology, Vol:4, 2, pp.76-85, ...

Fougeyrollas, P. Documenting environmental factors for preventing the handicap creation process: Quebec contribution relating to ICIDH and social participation of people with functional differences. Disabil. Rehabil. 1995, 17, 145–153. [CrossRef] [PubMed]

Franck, K.A.; Lepori, R.B. Architecture Inside Out; Wiley: New York, NY, USA, 2000; ISBN 978-0-471-98466-5.

Gleeson, B. (1997). The regulation of environmental accessibility in New Zealand. *International Planning Studies*, *2*(3), 367-390.

Goldsmith, Selwyn, *Designing for the Disabled*. Third Edition. London, RIBA Publications Ltd, 1976. 525 pages.

Gray,D.B.; Gould,M.; Bickenbach, J.E. Environmental barriers and disability. J.Archit. Plan. Res. 2003,29–37.

Gronvik, L. 2007. Definitions of Disability in Social Sciences. Methodological Perspectives. Acta Universitatis Upsaliensis. Digital comprehensive summaries of Uppsala Dissertations from the Faculty of social sciences 29. 52 pp. Uppsala. ISBN 978-91-554-6857-6.

Grosbois, Louis- Pierre. *Handicap Physique et Construction*. Third Edition. Paris: Le Moniteur, 1991. 327 pages.

Groth, C. Design and Craft thinking analysed as Embodied Cognition. FOR Makademisk Forsk ning stidsskrift Des. Des. 2016, 9. [CrossRef]

Groth, C.; Mäkelä, M. The knowing body in material exploration. In Proceedings of the 5th Art of Research Conference, Helsinki, Finland, 26–27 November 2014; pp. 26–27.

Hamzat, T.K. & Dada, O.O., 2005, 'Wheelchair accessibility of public buildings in Ibadan, Nigeria', Asia Pacific Disability and ...

Harnik, P. (2006). The excellent city park system: What makes it great and how to get there. *The Human Metropolis: People and Nature in the 21st-Century City [full book]*, 47.

Heylighen, A.; Devlieger, P.; Strickfaden, M. Design Expertise as Disability. In Communicating (by) Design; Chalmers University of Technology/Hoge school Voor Wetenschap & Kunst-School of Architecture Sint-Lucas: Göteborg, Sweden, 2009; pp. 227–235.

Heylighen, A.; Schijlen, J.; Van der Linden, V.; Meulenijzer, D.; Vermeersch, P.-W. Socially innovating architectural design practice by mobilising disability experience. An

exploratory study. Arch. Eng. Des. Manag. 2016, 12, 253–265. [CrossRef]

Ihde, D. Post phenomenology and Technoscience: The Peking University Lectures; SUNY Press: Albany, NY, USA, 2009; ISBN 978-1-4384-2622-8.

Imrie, R. Architects' Conceptions of the Human Body. Environ. Plan. Soc. Space 2003, 21, 47 [CrossRef]

Ingold, T. Making: Anthropology, Archaeology, Art and Architecture; Routledge: London, UK, 2013; ISBN 978-1-136-76367-0.

Ingstad, B.; Whyte, S.R. Disability and Culture; University of California Press: Berkeley, CA, USA, 1995; ISBN 978-0-520-08362-2.

Error! Hyperlink reference not valid. (1993) Disability Statistics, What We Count and What It Tells Us: A Personal and Political Analysis First Published July 1, 1993 Research Article https://doi.org/10.1177/104420739300400202

Jackson Liz (2018): Designing with Disability ... Lunch Talk: Liz Jackson, founder of TheDisabled List and blogger at The Girl with the Purple Cane

Jenks, M., & Dempsey, N. (2007). Defining the neighbourhood: Challenges for empirical research. *Town Planning Review*, *78*(2), 153-177.

Lakoff, G.; Johnson, M. Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought; Basic Books: New York, NY, USA, 1999; ISBN 978-0-465-05673-6.

Martin LM. Wheelchair accessibility of public buildings in Utica, New York. Am J Occup Ther 1987;41:217–221.

McAnulty, R. Body Troubles. In Strategies in Architectural Thinking; Whiteman, J., Kipnis, J., Burdett, R., Eds.; MIT Press: Cambridge, MA, USA, 1992; pp. 180–197.

McClain, L., Beringer, D., Kuhnert, H., Priest, J., Wilkes, E., Wilkinson, S., & Wyrick, L. (1993). Restaurant wheelchair accessibility. *American Journal of Occupational Therapy*, *47*(7), 619-623.

Micheal Arch Green https://www.archdaily.com/office/michael-green-architecture.

Molander, B. The Practice of Knowing and Knowing in Practices; Peter Lang GmbH: Frankfurt, Germany, 2015; ISBN 978-3-631-66990-7.

National Survey of Disability, 2006 vol 1.; https://www.ncld.org/ accessed Thursday 15, 2018

Nazarov, Z, and Lee, C. G. (2012). Disability Statistics from the Current Population Survey (CPS). Ithaca, NY: Cornell University Rehabilitation Research and Training Center on Disability Demographics and Statistics (StatsRRTC). Retrieved June 2, 2018 from www.disabilitystatistics.org

Nazarov, Z., & Lee, C.G 2012 *Disability statistics from the Current Population Survey (CPS).* Ithaca, NY: Cornell University Rehabilitation Research and Training Center on Disability Demographics and Statistics retrieved from www.disabilitystatistics.org

Netherlands. Ministry of Transport and Public Works. *Manual Traffic Provisions for people with a Handicap.* The Hague, 1986. 138 pages.

Noë, A. Action in Perception; MIT Press: Cambridge, MA, USA, 2004; ISBN 978-0-262-14088-

Nussbaum, M.C. Symposium on Amartya Sen's philosophy: 5 Adaptive preferences and women's options. Econ. Philos. 2001, 17. [CrossRef]

NUT (2016);h https://www.teachers.org.uk/help-and-advice/health-and-safety/c/class-sizes

Organization, M., Mavoa, S., Badland, H., Parker, K., Donovan, P., Kearns, R. A., ... & Witten, K. (2011). Associations between the neighbourhood built environment and out of school physical activity and active travel: an examination from the Kids in the City study. *Health & place*, *36*, 57-64. 7

Park, Sharon C. and Thomas C Jester "Strategies for Making Historic Properties Accessible to Persons with Disabilities". United States National Park Service, Preservation Assistance Division. 6 pages.

Perkowski, M.; Drabarz, A. The International Evolution of the Notiono f Disability and Its Interpretation from the European Union Law Perspective; Niczyporuk, P., Kołodko, P., Eds.; Studies in Logic, Grammar and Rhetoric; Wydawnictwo Uniwersytetu w Białymstoku: Białystok, Poland, 2012; ISBN 978-83-7431-363-6.

Pullin, G. Design Meets Disability; MIT Press: Cambridge, MA, USA, 2009; ISBN 978-0-262-16255-5.

Reid-Cunningham, A.R. Anthropological Theories of Disability. J. Hum. Behav. Soc. Environ. 2009, 19, 99–111. [CrossRef]

Rivano-Fischer, D. (2004). Wheelchair accessibility of public buildings in Al Ain, United Arab Emirates (UAE). *Disability and Rehabilitation*, *26*(19), 1150-1157.

Sanford, J. A. (19997). ... An E for ADAAG: The case for "ADA Accessibility Guidelines for the Elderly" based on three studies of toilet transfer.

Schön, D. The Reflective Practitioner: How Professionals Think in Action; Basic Books: New York, NY, USA, 1983; ISBN 0-465-06878-2.

Slessor,C. Redefining Modulor Manfora New Era of Inclusivity. Available online: https://www.architecturalreview.com/rethink/editorial-redefining-modulor-man-for-a-new-era-of-inclusivity/8669074.article (accessed on24October2017). Soc 2003; 18:357–371.

Scheldon School (2011) https://www.sheldonschool.co.uk/page/?pid=139

Suwa, M. Differentiation: Designers Are More than Being Good at Designing; Gero, J.S., Bonnardel, N., Eds.; Key Centre of Design Computing and Cognition, University of Sydney: Sydney, Australia, 2005; pp. 33–38, ISBN 978-1-86487-743-4.

Thapal, A,. Marjin, Mick E Aira Vasquez A langle K Scher S (2016) Phychiatric gene discoveries shape evidence on ADHD's biology. Molecular Psychiatry, 21(9)

The Canadian Paraplegic Association, Manitoba Division. *Access: A Guide for Architects and Designers*. Second Edition, Manitoba, Canada, the Canadian Paraplegic Association, Manitoba Division, 1989.

The Housing Committee for the Handicapped (NKB). "Accessibility of Buildings to Handicapped Persons: Guidlines for Nordic Building Regulation" (preliminary draft). Copenhagen, 1973. 14 pages.

The Research & Training Center of Independent Living. *Guidelines for Reporting and Writing About People With Disabilities*. Third Edition. Lawrence, Kansas, USA, 1990. 4 pages.

The Swedish International Development Authority (SIDA) in collaboration with the United Nations and Habitat. *Designing with Care: A guide to Adaptation of the built Environment for Disabled People*. United Nations, International year of Disabled Persons (IYDP) 1981. 102 pages.

ThecaseofCarlosMourão Pereira. In The Place of Research, the Research of Place; Architectural Research Centers Consortium (ARCC): Washington, DC, USA, 2010; pp. 393–400.What Is the Definition of Disability under the ADA?|ADA National Network. Available online: https://adata.org/faq/what-definition-disability -under-ada (accessed on 24 October 2017)

Tiana M. Bochsler, Gordon E. Legge, Rachel Gage, Christopher S. Kallie Recognition of Ramps and Steps by People with Low Vision Invest Ophthalmol Vis Sci. 2013 Jan; 54(1): 288–294. Published online 2013 Jan 9. doi: 10.1167/iovs.12-10461

Tschumi, B. Architecture and Disjunction; MIT Press: Cambridge, MA, USA, 1996; ISBN 978-0-262-70060-3.

UNICEF. 2016. "Libya 2016 Humanitarian Action for Children." UNICEF. Accessed August 12 2016. http://www.unicef.org/appeals/libya.html.

UNICEF. 2006. "Libya 2016 Humanitarian Action for Children." UNICEF. Accessed August 12 2006. http://www.unicef.org/appeals/libya.html.

United Nations convention, 2006 retrieved from https://www.un.org/development/desa/disabilities/convention-on-the-rights-of-persons-with-disabilities.html

Useh, AM Moyo, E. Munyonga, U. (2001). Wheelchair accessibility of public buildings in the central business district of Harare, Zimbabwe. *Disability and Rehabilitation*, *23*(11), 490-496.

Varela, F.J.; Thompson, E.; Rosch, E. The Embodied Mind: Cognitive Science and Human Experience; MIT Press: Cambridge, MA, USA, 1991; ISBN 978-0-262-72021-2.

Verbeek, P.-P. What Things Do: Philosophical Reflections on Technology, Agency, and Design; Penn State Press: University Park, PA, USA, 2010; ISBN 978-0-271-04656-3.

Vermeersch, P.-W. Heylighen,A.Blindnessandmulti-sensorialityinarchitecture:

Wash Room Cubicle, 2018 https://www.washroomcubicles.co.uk/ accessed December 23, 2018

Welage, N. and K.P.Y. Liu, Wheelchair accessibility of public buildings: a review of the literature. Disability and Rehabilitation: Assistive Technology, 2011. 6(1): p. 1-9.

Wheel chair entrance requirements (Accessed from homedesignersuite.co)

WHO 'International Classification of Functioning, Disability and Health' (2001) accessed via http://siqual.istat.it/SIQual/files/ICF_18.pdf?cod=434&tipo=11 (6 February 2015)

Winance, M. Trying out the wheelchair: The Mutual Shaping of People and Devices through Adjustment. Sci. Technol. Hum. Values 2006, 31, 52–72. [CrossRef]

World Health Organization. (2011). World report on disability: World Health Organization.

Yin, R.K. Case Study Research: Design and Methods; SAGE Publications: Thousand Oaks, CA,

USA, 2013; ISBN 978-1-4833-2224-7.

Zumthor, P. Thinking Architecture; Birkhäuser Basel: Basel, Switzerland, 2010; ISBN 978-3-0346-0585-4.

APPENDICES

Appendix 1

Questionnaire for the Disabled Libyan High School Students

1. What is your disability? (Please select the most suitable description)
   - ☐ Autism
   - ☐ Attention Deficit/Hyperactivity Disorder
   - ☐ Colour Blind
   - ☐ Hearing Impaired
   - ☐ Mental Illness
   - ☐ Physical Disability
   - ☐ Specific Learning Difficulties
   - ☐ Speech Impaired
   - ☐ Visceral Disability
   - ☐ Visually Impaired
   - ☐ Others, please specify: _____

2. Do you need special assistance for travelling to the campus? If yes, how is it arranged?

   _____

   _____

   _____

3. Do you need special arrangements when attending lectures?

   _____

   _____

   _____

4. Do you need assistance or special equipment in your studies and in completing course assignments?

_____

_____

_____

5. Do you envisage any activities in your study programme that you cannot attend, such as field trips, laboratory work, etc.?

_____

_____

_____

6. Do you need special arrangements for examinations? (Please tick the appropriate box(es))

- ☐ Taking the examinations in a separate room
- ☐ Allowing extra examination time? Please specify:_____
- ☐ Providing additional or special equipment, please specify:_____

  _____
- ☐ Allowing rest breaks? (not to be counted in examination time) Please specify:_____
- ☐ Others, please specify: _____

  _____