ADDRESSING WAY-FINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSON'S IN THE DESIGN OF EYE-CENTRE, JALINGO

BY

PAUL URERIMAM MAIGARI

DEPARTMENT OF ARCHITECTURE
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA

FEBRUARY, 2017

ADDRESSING WAY-FINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSON'S IN THE DESIGN OF EYE-CENTRE, JALINGO

BY

PAUL URERIMAM MAIGARI, B.SC. (ARCH. ABU, ZARIA) 2013
P13EVAT8141

A DISSERTATION SUBMITTED TO THE SCHOOL OF POSTGRADUATE STUDIES, AHMADU BELLO UNIVERSITY, ZARIA

IN PARTIAL FULFILLMENT FOR THE REQUIREMENTS FOR THE AWARD OF MASTERS DEGREE OF SCIENCE IN ARCHITECTURE

DEPARTMENT OF ARCHITECTURE,
FACULTY OF ENVIRONMENTAL DESIGN
AHMADU BELLO UNIVERSITY,
ZARIA, NIGERIA

FEBRUARY, 2017

DECLARATION

I declare that the work in the dissertation 'Addressing Way-Finding Techniques for visually impaired Person's in the design of Eye-Centre, Jalingo'has been performed by me in the department of Architecture under the supervision of Dr. M.D. Ahmed and Dr. M. O. Gafar. The information derived from the literature has been duly acknowledged in the text and a list of references provided. No part of this thesis was previously presented for another degree at any university.

Paul UrerimamMaigari	_____	_____
Name of Student	Signature	Date

CERTIFICATION

This dissertation titled 'ADDRESSING WAY-FINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSON'S IN THE DESIGN OF EYE-CENTRE; JALINGO'by Paul Urerimam MAIGARI meets the regulations governing the award of the degree of Master of Science in Architecture of Ahmadu Bello University, Zaria, and is approved for its contribution to knowledge and literacy presentation.

Dr M. D. Ahmed _____ Date _____
Chairman, Supervisory Committee

Dr M. O. Gafar _____ Date _____
Member, Supervisory Committee

Dr A. S. Salisu _____ Date _____
Head of Department

Prof. S. Z. Abubakar _____ Date _____
Dean, School of Post Graduate Studies

ACKNOWLEDGEMENT

My gratitude goes to my supervisors Dr. M. D. Ahmad and Dr.Mudashir O. Gafar and supervisory jury Dr H.T. Kimeng, Arc. A. Eneh, Dr A. Abdullahi, Permit me to thank the entire staff of the department of architecture (both academic and non-academic) most especially my Supervisory committee chairman, and members of jury whom out of there tire scheduled checked and corrected my works when I call on them, the committee members it was not an easy task to comment, corrected and offered constructive criticisms and valuable suggestions in an attempted at improving the quality of the dissertation. Besides, my genuine gratitude goes to my siblings; namely RimamchikaMaigariEkin, Daniel James, BentiMaigari, Michael RimamskebMaigari, Ruth John, and my sister PunarimamMaigari for their encouragement, counselling, moral and financial support every now & then. So also to my concerned parents Mr.&Mrs. John MaigariEkin for their never-ending prayer, ethical support, glowing wishes, et cetera. Also, I am earnestly grateful to all members of the family. Generous persons whom I came across that rendered help of some sort in the questionnaire administration and case study as far the field survey during visitation to school for the blind children Gindiri, Mangu in person of Mr. Ado Yusuf, Mr. Geoffrey GuwalMr. Samuel Dapil, Corinthians Zachary Baraje, Daniel Zachary Baraje are hereby acknowledged. My intimate cronies can never be forgotten by any means; MakajuolaIbinaiye, Alati Samuel Waziri, Simeon Odih, and to the many friends and colleagues whom we have been together all this while whose names did not appear on this page.

DEDICATION

This dissertation is dedicated to God and my little sister Puna-RimamMaigari.

Abstract

Hospital is a complex structure that involves multi-functional activities which create way-finding challenges for patients and visitors in the environment, most especially the visually impaired person who normally have difficulties in finding their way around the normal day to day society. The visually impairednaturally encounter serious challenges in every hospital facility they find themself. The aim of this study is to address way-finding techniques for the visually impaired persons in the design of an eye-centre. There arevarious methods of conducting research in the field of behavioural science, and several others. All these are accepted provided that the research follows a logical arrival to portray logical data collections.Analysis of the collected result and presentations of result concludesthe methodology employed for this study and the assessment of the selected eye centre and schools which admit the visually impaired. Purposive sample techniques were used for the selection of three most relevant case studieswhich are; School for the Blind children (SBC) GindiriMangu LGA, Visually Impaired Government Vocation Training Centre (VIGVTC) Zawan, Jos-south,Plateau state, and National Eye Centre Kaduna, Kaduna state. Data analysis was descriptive and quantitative, for the report of case study, material, and material usage in the facilities studied. The questionnaire was also analysed quantitatively.Data obtained from the field was inputted in Ms-excelfor the calculations of the opinions of the respondents, and then subsequently, interpretations of the respondent's opinionsweresummarized in tables and charts. Eighty (80) questionnaires were collected back and analysed in the study.Respondents from SBC and VIGVTC were selected using purposive and random sampling from a population of about 1000 visually impaired that were present in the schools above age 15 years.

The key research findings indicated that most existing facilities for the visually impaired in Nigeria do not consider visually impaired person's mobility and accessibility. In fact,the various cases studied showed that most designers adopted traditional/conventional design techniques which do not cater for the visually impaired in terms of way-finding. Therefore, there is need to inculcate modern way-finding techniques and design parameters for the enhancement of visually impaired people's movement in eye centres. In addition, consideration of visually impaired people in architectural design process is vital. Finally the research demonstrated a design incorporating modern way-finding techniques in the design of an eye-centre.

TABLE OF CONTENTS

Cover Page…… i

Title Page…… ii

Declaration…….iii

Certification…… iv

Acknowledgement…… v

Dedication…… vi

Abstract…….vii

Table of Contents……viii

List of Tables……...xiv

List of Figures……...xv

List of Plates……...xvii

List of Appendices……xx

Definition of Terms……..xxi

CHAPTER ONE

INTRODUCTION

1.1 Background of Study……1

1.2 Problem Statement……6

1.3 Aim and Objectives……...7

1.4 Research Questions……...7

1.5 Justifications……..8

1.6 Scope of the Study……8

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction……10

2.2 History of Orientation and Mobility……10

2.3 The Concept of way-finding……...11

2.4 Principle of Way-Finding……...13

2.5 Signage as a tool for Way-Finding……14

2.5.1 Cognitive Mapping as tool of Mobility……15

2.5.2 Tactile ground surface indicator (TGSI)……...16

2.5.3 Colour as tool for Way-finding……17

2.5.4 Use of animals for Way-finding……18

2.5.5 Sense of Touch or Haptic Information……..19

2.6 Benefits of Good way-finding for visually impaired……20

2.7 Visual Impaired Person……..21

2.7.1 Categories of visual impaired……...22

2.7.2 Historical of aid for people with visual impairment in Nigeria……23

2.7.3 Visual impaired person's Management in African Society……..24

2.8 Statistic of abled and disable person in world……..24

2.8.1 Statistical distribution of visual impairment in Nigeria……25

2.9 Cause of Visual Impairment in Nigeria……27

2.9.1 Ecological Zones and Blindness……...27

2.10 Prevalence's in Nigeria……...28

2.11 Intervention for Visually Impaired……...30

2.12 Summary of Literature Review……31

2.13 Conclusions……33

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction……35

3.2 Research Design……..35

3.3 Population of Study……37

3.4 Sample and Sampling Techniques…….37

3.5 Instruments for Data Collection……38

3.6 Procedure for Administration of Instruments…….38

3.7 Data Analysis Procedure……39

3.8 Data Presentation Method / Analysis……39

3.9 Conclusion……...39

CHAPTER FOUR

CASE STUDY

4.1 Introduction……41

4.2 Case Study 1: Brief history of the school for the blind children Gindiri……..41

4.3 Spatial Organisation (S.B.C.) Gindiri……...42

4.4 Building Circulation (S.B.C.) Gindiri……...42

4.5 Architectural character……..44

4.5.1 Roofs of S.B.C. Gindiri, Mangu……...44

4.5.2 Ceiling board S.B.C. Gindiri, Mangu……...46

4.5.3 Rafter of S.B.C. Gindiri, Mangu……..46

4.5.4 Wall of S.B.C. Gindiri, Mangu……47

4.5.5 Doors and Windows of S.B.C. Gindiri, Mangu……48

4.5.6 Floor Finishes of S.B.C. Gindiri, Mangu…….48

4.5.7 Finishes of S.B.C. GindiriMangu……49

4.6 Case study 2: Brief history of Gov't Vocational Training Centre, Zawan……50

4.7 Spatial Organisation……...51

4.8 Building Circulation……...51

4.9 Architectural Character……52

4.9.1 Roof of G.V.T.C. Zawan……..52

4.9.2 The consideration of visual impairment G.V.T.C. Zawan……53

4.9.3 Wall of G.V.T.C. Zawan……...54

4.9.4 Floor Finishes of G.V.T.C. Zawan……54

4.10 Case study 3: Brief introduction of national eye centre Kaduna (NEC) interview……...55

4.10.1 Spatial Organization……..55

4.10.2 Building Circulation……..56

4.10.3 Architectural Character……57

4.10.4 Wall of national Eye centre Kaduna……58

4.10.5 Doors and Windows of National Eye Centre, Kaduna…….58

4.10.6 Finishes of National Eye Centre, Kaduna……59

4.10.7 Services and facilities……61

4.11 Building Materials and Structure……..63

4.12 Landscape of the National Eye Centre (NEC) Kaduna……..63

4.13 Conclusion of Case Study……..64

CHAPTER FIVE

FINDINGS AND DISCUSSION

5.1 Introduction ……67

5.2 Detail of the Analysis of the Questionnaire……..67

5.3 Section A of the Questionnaire Bio-Data…….67

5.3.1 Section B of the questionnaire (Way-Finding)……71

5.3.2 Way-finding……71

5.3.3 Section B II Consciousness of your environment among visual impairment…….74

5.3.4 Section B III Way-Finding techniques approach use by visually impaired to walkaround……82

5.4 Discussion and General Summary……..92

5.5 Conclusion…….93

CHAPTER SIX

DESIGN REPORT

6.1 Introduction……94

6.2 Principle Adopted to the Design……94

6.3 Design Frame Work……94

6.4 Design Brief…….95

6.4.1 General requirement for the design of eye centre……96

6.4.2 Brief development (interview)……..97

6.5 Studied Area……98

6.5.1 Site Selection Criteria for Hospital……100

6.5.2 Proposed Architectural Design……..107

6.6 Conclusion……114

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction……...115

7.2 Summary……115

7.3 Contribution to Knowledge……..116

7.4 Recommendations……117

7.5 Areas for Further Research……118

7.6 Conclusion……118

REFERENCE……119

APPENDICES ……..126

LIST OF TABLES

Table 1.1 Categories of Visually Impaired ……9

Table 2.1 Distribution of Nigeria population based on projections from the 1991 census……...26

Table 2.2 Prevalence of blindness and visual impairment across the ecological Zones…….28

Table 2.3 Estimated number of visual impaired and blind person aged ≥40 years in the GPZs……..28

Table 2.4 Risk factor based on age……...29

Table 4.1 Conclusion of Case Study……66

Table 5.1 Visual Acuity……92

LIST OF FIGURES

Figure 2:1: Signage as a tool for-way-finding ……14

Figure 2:2 Cognitive Mapping as Tool of Mobility……...15

Figure 2:3 Colour schemes…….18

Figure 2:4 Use of Animal for way-finding……19

Figure 2:5 Haptic tools……..20

Figure 2:6 World Maps……..25

Figure 2:7 Estimated number of blind adult in different geo-political zones in Nigeria……..26

Figure 2:8 Rate of Prevalence of Impairment……27

Figure 2:9 Hand Tools……30

Figure 4:1 SBC site map Gindiri……42

Figure 5:1 Gender Distribution of G.V.T.C. Zawan and S.C.B. Gindiri……68

Figure 5:2 Age distributions of G.V.T.C. Zawan and S.B.C. Gindiri……69

Figure 5:3 Marital Distributions of G.V.T.C. Zawan and S.B.C. Gindiri……..70

Figure 5:4 Occupational Distributions of G.V.T.C. Zawan and S.B.C. Gindiri……71

Figure 5:5 Way-finding (categories of visual impairment)……72

Figure 5:6 Way-finding (categories of visual impairment)……73

Figure 5:7 Way-finding (categories of visual impairment)……73

Figure 5:8 Categories of visual impaired (G.V.T.C. Zawan)……74

Figure 5:9 Consciousness of your environment (way-finding)……..75

Figure 5:10 Consciousness of your environment (G.V.T.C. Zawan)……..75

Figure 5:11 Consciousness of your surrounding……..76

Figure 5:12 Consciously knowing your surrounding……..77

Figure 5:13 Consciousness of your environment…….77

Figure 5:14 Consciousness of your environment (G.V.T.C. Zawan)……...78

Figure 5:15 Consciousness of the environment……78

Figure 5:16 Consciousness of the environment (G.V.T.C. Zawan)…….79

Figure 5:17 Consciousness of your environment…….80

Figure 5:18 Extend of understanding (G.V.T.C. Zawan)……80

Figure 5:19 Use of mobility cane……81

Figure 5:20 Use of mobility cane (G.V.T.C. Zawan)……..82

Figure 5:21 Manoeuvre your ways……...83

Figure 5:22 Manoeuvre your ways GVTC Zawan……...83

Figure 5:23 Manoeuvre in room space……84

Figure 5:24 Manoeuvre in room space GVTC Zawan…….85

Figure 5:25 Searching of things……85

Figure 5:26 Searching of things……86

Figure 5:27 Missing destinations……..87

Figure 5:28 Missing destinations……..87

Figure 5:29 Change in level……..88

Figure 5:30 Change in level GVTC Zawan……..88

Figure 5:31 Notice change……89

Figure 5:32 Differentiate spaces……...90

Figure 5:33 Differentiate spaces GVTC Zawan……...90

Figure 5:34 Understanding places……91

Figure 5:35 Understanding places GVTC Zawan……91

Figure 6:1 Conventional designs and planning of hospital……95

Figure 6:2 Site development concepts……98

Figure 6:3 Map of Taraba……...99

Figure 6:4 Site locations……...102

Figure 6:5 Climate Analyses……103

Figure 6:6 Soil Analyses……..104

Figure 6:7 Solar Analyses……104

Figure 6:8 Vegetation Analyses……...105

Figure 6:9 Contour/Topography Analyses……...106

Figure 6:10 Proposed site Plan……...107

Figure 6:11 General out-patients Department (GOPD)……..108

Figure 6:12 Glaucoma clinics……109

Figure 6:13 Onchocerciasis clinics……110

Figure 6:14 Surgical/ theatre unit……...111

Figure 6:15 Laboratories……112

Figure 6:16 Accident and emergency bay……113

Figure 6:17 Inpatient section……114

LIST OF PLATES

Plate 2:1 Directional indicators ……..16

Plate 2:2 Warning Indicator…….17

Plate 2:3 Visual Impaired Person…….22

Plate4:1 Circulations within SBC Gindiri……...43

Plate 4:2 A View of Class……44

Plate 4:3 A View of Roofing sheets…….45

Plate 4:4 View Asbestos……...45

Plate 4:5 A view of the ceiling board……...46

Plate 4:6 A View of the rafters…….47

Plate 4:7 Administrative Block……47

Plate 4:8 A View of the door……48

Plate 4:9 A view of floor in the assembly hall…….49

Plate 4:10 Finishes on the walls…….49

Plate 4:11 Signboard of G.V.T.C. Zawan……..50

Plate 4:12 Google site map of G.V.T.C. Zawan……50

Plate 4:13 G.V.T.C. Zawan Spatial Layout……...51

Plate 4:14 Visual impaired student moving within the facility……..52

Plate 4:15 A View of classroom in G.V.T.C. Zawan……53

Plate 4:16 A View of ramp in the administrative block……53

Plate 4:17 A view of Walls finishes in G.V.T.C. Zawan……...54

Plate 4:18 A view of Floor finishes……....55

Plate 4:19 As Built Model for national Eye Centre Kaduna……..56

Plate 4:20 Paved Circulation Area…….57

Plate 4:21 Horizontality and verticality…….57

Plate 4:22 900mm above ground level hand railing…….58

Plate 4:23 Double swing doors…….59

Plate 4:24 Array of windows……59

Plate 4:25 Checker rubber tile lay along the corridor……60

Plate 4:26 Stone coated glazed tile……60

Plate 4:27 Water supply tank……61

Plate 4:28 Parking space for senior medical workers……62

Plate 4:29 Vertical movement To Administrative offices……63

Plate 4:30 Concrete paved area……64

LIST OF APPENDICES

APPENDIX 1 ……126

APPENDIX 2……127

APPENDIX 3……128

APPENDIX A3……129

APPENDIX A4……130

APPENDIX A2……131

APPENDIX A3……135

APPENDIX A4……137

APENDIX A5……..138

DEFINITION OF TERMS

Way-finding: ability to locate once position due to available physical feature your brain can decode or is dynamic in that people's movement with their direct sense of orientation to place must be accommodated.

Visual Impairment: typically refers to vision loss that is not correctable with eyeglasses or contact lenses.

Orientation: the process of becoming accustomed to a new situation or set of surroundings.

Mobility: The ability to move about, especially to do work or take exercise or the ability of somebody to change from one social group or class to another.

Landmarks or Markers: a prominent structure or geographic feature that identifies a location and serves as a guide to finding it.

Nodes: a terminal or other point in a place where road networks where a connected and can be created, received, or transmitted.

Edges: a line or area that is the outermost part or the part farthest away from the centre of something.

Zones or Districts: an area of a town or country, especially one with a distinguishing feature or one that is an administrative division.

1.0 INTRODUCTION

1.1 Backgroundof Study

Huelat, (2007) define Way-finding as a person's spatial behavior or orientation to space. Spatial behavior is the static relationship to space or the environment. This relationship requires the user to form an overall mental image of the layout of the place. This image is referred to as the cognitive map of the setting. Chao, (2004) define Cognitive mapping as the ability to imagine a map, and way-finding uses the cognitive-mapping process to solve location-based problems.

Way finding is a dynamic relationship to the space (Huelat, 2007). It is dynamic in that people's movement with their direct sense of orientation to place must be accommodated. Passini&Arthur, (1992) as cited by (Huelat, 2007) describe way finding as a spatial problem-solving process with three specific but interrelated processes, a).Decision Making; b).Decision Execution. c). Information processing; understanding its generic sense as comprising environmental perception and cognition, which in turn, are responsible for the information basis of the two decision-related processes.

According to Hunter, (2010) despite its demonstrated importance to building use and operational efficiency, there are no regulated standards on way-finding and way-finding design. However, U.N. Life Safety Codes and accessibility standards affect the design of certain way-finding elements. Standards related to information way-finding can also be found in. a) Local building codes and; b). Zoning ordinances may include additional standards for such elements as pathways, circulation systems, exits and entrances not covered in national standard books.

Thus, a good way-finding system considers this decision-making process and the knowledge of the way-finder, as well as good tools and clues to aid in successful decision making and clear recognition of pathways and destinations (Huelat, 2007). Tools of good way finding are components designed to support spatial orientation and cognitive mapping. Redundancy and overlap of these tools are also helpful to assist people with varying cognitive skills. They do so in four ways.

1. They respond to verbal communication, where one person explains directions to another.
2. Some gain understanding primarily through personal interaction with people.
3. Some people are cognitively focused, relying on maps and written directions.
4. While others respond to visual cues such as landmarks, colors, and noticeable features.

Holscher, Meilinger,Vrachiliotis, Brosamle, &Knauff(2007).Maps can be distributed from an electronic kiosk,with touch screen interaction regarding the destination and best route to take. The comprehensive and cohesive signage system supports the pathways identified on the maps (Golledge, 1999). Richardson (1981) pointed those that depend on verbal cues; the map also works well especially when a real person gives the map with both verbal and written directions. The information desk is a great place to introduce the way-finding process Huebner&Koenig (n.d). This also allows the way finder the opportunity to ask questions and confirm directions. Auditory directions, especially at entrances and elevators, provide added reinforcement that the visitor has entered or exited at the correct location or floor.

Landmarks, bold graphics, and artwork provide helpful clues to those who are more visually focused. Water features (water fall and fountain, moving water), sculpture, rough

surfaces and outdoor views all provide visually abled and visually impaired milestones to help mark the pathways. Landmarks should be easily recognizable and clearly identified on the maps. There are still others that can only manage to navigate the system with personal assistance. According to Hassard (n.d.) this requires the personal assistance of hospital staff or volunteers to direct the visitor to their destination. A successful way-finding system also considers the way in which people receive information and establish a sense of spatial orientation. A good way-finding system is redundant and supports all four methods.

1. Informational.
2. Directional.
3. Identifying.
4. Regulatory.Hassard , nd

Microsoft Encarta (2009) refers Visual impairment as, total or partial inability to see because of disease or disorder of the eye, optic nerve, or brain. The term visual impairment typically refers to vision loss that is not correctable with eyeglasses or contact lenses. Visual impairment may not necessary mean a total absence of sight, however. Some people who are considered visually impaired may be able to perceive slowly moving lights or colours. Visual impairment refers to a vision loss so pronounced that the individual learns best through touch and listening, rather than through sight, even with adaptive aids. In medical science visual impairment is defined as a functional limitation of the eye(s) or visual system to manifest or reduced visual acuity or contrast sensitivity, visual field loss, photophobia, diplopia, visual distortion, visual perceptual difficulties, or any combination of the above (Heath, Amos & Miller, 2010).

According to Accessible Design for the blind(2000) Vision impairments are diagnosed by medical doctors who examine the physical structures in the eye and evaluate the individual's ability to see shapes of different sizes at various distances. Approximately 12 out of 1,000 individual receive some form of special education because of visual impairments.Base on report by W.H.O and International Agency for Prevention of Blindness (IAPB), as cited by Nada, Fakhr, &Seddik, (2014) stated that there are approximately 285 million persons around the world who are visually impaired, out of which 39 million are legitimately medically proven that they are completely blind. Africa and other developing countries represent 90% of this statistics.According to WHO and IAPB, as cited by Nada, Fakhr, &Seddik, (2014) the number of blind people will increase worldwide to reach the double by 2020. According to world health organization, (2007) Over 75% of the people in the world who are legitimately medically proven that they are blind have some residual vision, 11.5 million people have some degree of visual impairment. According to world health organization, (2011) predictably, disability is not randomly distributed across the population.

Looking at the studies on history of hospitals from history to date, the design and allocation of spaces in hospitals pays attention to the patients who are visually sound without considerations of visually impaired patient or signage spaces were not designed to cater for this special group of people.

Lang, (2011) as cited byLelhaj&Sarbongholi, (2014) standard space design which is designed for the people with high physiological capabilities, the deaf, the blind and those with mobility problems causes limitations.

Clinical practice especially in the Ophthalmology departments or sections focus mainly on treatmentof eye related illnesses, no special attention to blind, while often neglecting a patient's psychological, social, and environmental qualities that are psycho-socially supportive, which stimulates and engages patients, both mentally and socially to aid healing have not been developed properlyBehkami& David (2009).

There is no specialized optical hospital designed to treat and manage any case of blindness in Nigeria Behkami& David (2009).The few hospital in the North with eye clinic/Centre never put in to consideration management of blind patients i.e. National eye Centre Kaduna is not specialized in managingand controlling movement of blind patient within thefacilities, and few traditional hospitals with Ophthalmology department are unsuited for the total treatment and management of blind patients. According to Blind Survey (2005-2007) theNigerian Ophthalmology departments lack quality and stimulating environments that stop maneuvers of blind patients need to encourage their rate of movement and improve the rate of recovery at quality time.

Like the people with disabilities in the United States and Great Britain, disabled people in Australia have more likely lower income and less education compared to the non-disabled population. The government of the day should provide useable space, roads, circulations area for visually impaired person (Mollerup, 2009).

When patient visit the hospital in seeking treatments, sometimes the moment, they enter the hospital entrance, the environment of the space makes them feel uncomfortable and stressful (Haron, Hamid, &Talib, 2011). Spatial design is about the human experience reaction and interaction to the space. A good spatial design as suggest by Passini and Arthur, (1992) can reduce patients stress and frustration. Hence functional efficiency,

visitor accessibility, patient empowerment, safety, improving cognitive skills in spatial understanding and physical efforts (Huelat, 2007) it has to do the overall efficiency and effectiveness of the hospital design and satisfaction (Haron, Hamid, &Talib, 2010).Hence most of the research also has shown that design based on users experience and taking their opinion can produce a better and positive design outcome and meet organization and users goals (Behkami& David,2009).

1.2 Problem Statement

Foster&Noe, (2008)opined that promoting access to public accommodation, including religious buildings, hotels, motels, and other places of public gathering, is important should ensure that everyone regardless of disability, has an equal opportunity to enjoy their services and facilities. Equally Wilm, Foster &Noe, (2008) pointed out, that the importance of including visually challenge into the political agenda is increasingly recognized across the globe. In this way it is of paramount importance to pull the visually disabled into this space and relieve them of seclusion, isolation, depression and, feelings of helplessness.The problem encounter by blind person most in Nigeria architect do not consider the visual impaired persons on how to find's one's way,the research tends to provide system that will making the visual impaired navigate through built up space without being help.

Providing conducive living conditions are important factors in attracting visually disabled people in society. Paying attention to the visually disabled people results in their positive presence in the society and their capabilities/talent can be used in different parts of society. As the visually disabled people are a stratum of society that has been always in need for others for their daily needs, in this study the researcher willproduce a model that will serve as architectural template that will make an ordinary blind person feel catered for, and move without being led by any visual abled person. People (visual impaired) who are considered

as users of this space are the central issue in this architectural research, therefore it is essential to understand them before making the design.

1.3 Aim and Objectives

The aim of this study is to address way-finding techniques for the visual impaired personsin the design of an eye-centreJalingo.The objectives of the study are:

I. To identify the nature of the different type of visualimpairment.
II. To identify techniques employed by visually impaired person to find their way around.
III. To identify the activities and the facilities visually impaired persons requiregetting around a built up space.
IV. To propose a design that will serveasmodel useable by visually impaired persons.

1.4 Research Questions

Since the research is meant to create useable space for visual impaired/blind person without help, then, it will be expected to answer the following questions:

I. What are the different types of visual impairments?
II. What are the techniques employed by visually impaired persons to find their way around in accessing public space?
III. What are the activities and the facilities the visually impaired persons need to get around in a typical building complex?
IV. How can design address issues of way-finding among visual impaired be produced?

1.5 Justifications

There is a need forease of interaction and self-sustenance.Generally the visual impaired are mostly stigmatized unconsciously due to loss of vision either at birth or as a result of one

sickness or the other, to avoid these menace of seclusion and idleness for visually impaired person there is a need for the architect, designers and professionals in building industry to incorporate them during the conceptual stage of the design. This has sparked up the researcher to embark on this research 'addressing way-finding techniques for visual impair person in the design of eye centre' in order to come up with the good design of eye centre which will in turn increase productivity and occupancy satisfaction.

The need for promoting greater access as an effective approach to reversing exclusion and enhancing the equalization of opportunities in a sustainable way has been adopted globally through the UN Convention on the Rights of Persons with Disabilities (UNCRPD), which was approved by the General Assembly in December 2006 and entered into force in May 2008. It establishes the legal frame for policy change and actual implementation towards achieving accessibility for all.

> ***Article 9*** *of the UNCRPD on* ***"Accessibility"*** *stipulates that persons with disabilities are to be enabled to live independently and participate fully in all aspects of life. This implies that States Parties should "[…] take appropriate measures to ensure to persons with disabilities access, on an equal basis with others, to the physical environment, to transportation, to information and communications, including information and communications technologies and systems, and to other facilities and services open or provided to the public, both in urban and in rural areas […]".*

1.6 Scope of the Study

The scope of this study would encompass a study of existing national eye centre Kaduna, Kaduna State, school for the blind children, Gindiri, Mangu& government vocational training centre Zawan, Jos South, Plateau State.World Health Organization categories of vision loss were used to define blindness and severe visual impairment, allowing international comparisons to be made as shown in Table 1.1.

Table 1.1Categories of Visually Impaired

Categories of visual impairment	Ranges of visual	remarks
Blindness	3/60	Medically blind
Severe Visual Impairment (SVI)	6/60 to 3/60	Partial blind
Moderate Visual Impairment (Mod VI)	6/18 to 6/60	Partial sighted
Mild Visual Impairment (Mild VI)	6/12 to 6/18	Little problem
Normal (N)	6/12	Good sight

The geographicalareas covered are national eye centre Kaduna,school for the blind children, Gindiri, Mangu& government vocational training centre Zawan, Plateau State Nigeria.As a result of this,one hospital and schoolsthat admit visual impaired will be selected.National eye-centre spaces and how they (visually impaired) behave in an interior space will be used to have a good sample size that effective result will be obtained.

The facility will be situated in Jalingo, Taraba State, and North-Eastern Nigerian due to high level of blindness in Garbabi.

2.0 LITERATURE REVIEW

2.1 Introduction

As opined by Microsoft Encarta,(2009)Criticism, discussion of literature, is including description, analysis, interpretation, and evaluation of literary works. Like literature, criticism is hard to define. One of the critic's tasks is to challenge definitions of literature and criticism that seem too general, too narrow, or unworkable for any other reason. Whatever it is literary criticism deals with different dimensions of literature as a collection of texts through which authors evoke more or less fictitious worlds for the imagination of readers.

2.2 History of Orientation and Mobility

The profession of Orientation and Mobility began to develop during, and immediately after, World War II, when soldiers who had been blinded in battle were sent to recuperate at Valley Forge Army General Hospital before entering Avon Old Farms Convalescent Hospital, the U.S. Army's former experimental rehabilitation centre for blind soldiers in Avon, Connecticut. In order to better serve the large number of blind soldiers who required special training and services, the military recruited Richard E. Hoover, an army sergeant, who was assigned to the centre for the treatment of blinded soldiers at Valley Forge Army Hospital in 1944. During the same year, Russell Williams, who was blinded by enemy action in France, received medical rehabilitation at the Valley Forge Army Hospital, and in 1947, C. Warren Bledsoe joined the Hospital. Both Hoover and Bledsoe had

previouslyworked at the Maryland School for the Blind. These three men made significant contributions to the development of a new profession: Orientation and Mobility.

The blinded soldiers were highly motivated to be successful, and Richard Hoover believed that the traditional strategies taught and used to travel independently were inadequate. In response, he developed a technique for using a cane that is lightweight and longer than support canes. This technique and cane revolutionized independent travel for blind people and are still used today. http://www.visionaware.org/info/everyday-living/essential-skills/an-introduction-to-orientation-and-mobility-skills/123 retrieved on 19th march, 2016

2.3 The Concept of way-finding

Sprow, (2012), Way-finding is more than signs,finding one's ways are an essential ability and a prerequisite for autonomy and independence, thereby promoting self-sufficiency and self-esteem (Marquardt, 2012). Way-finding is as much an architectural issue as a graphic issue (Hunter, 2010). Architects and designers need to take serious concern for inclusive approaches to way-finding and learn more about the psychological impacts on the blind person within his built space.Maina& Umar, (2015) were of the opinion that special attention to physical building elements as way-finding features whilst serving their primary functions of structural support as well as aiding access and movement within buildings.

Lynch, (1960) is credited with coining the term way-finding in 'The Image of the City', where he referred to maps, street numbers, directional signs and other elements as 'way-finding devices'. The terminology has developed into five main architectural way-finding elements

1. Paths and circulation,
2. Landmarks or markers
3. Nodes
4. Edges
5. Zones or districts (Lynch, 1960)

Whether addressed through architecture or information, the design of way-finding systems should include: (1) identifying and marking spaces; (2) grouping spaces; (3) linking andorganizing spaces; and (4) communicating this information to the user.

Way-finding design guidelines and best practices vary by building type, size, and layout; urban, suburban or rural location; frequency of use; and user requirements, preferences, and characteristicsDowns &Stea (cited in hunter, 2010).The process of finding one's way includes knowing where you are; knowing your destination, knowing (and following) the best route to the destination, recognizing the destination upon arrival, and finding the way back Brush & Calkins (as cited in Marquardt,2012).

Provide as many way-finding clues in the environment or in the architecture as possible, rather than through signage (Marquardt, 2012). Landmarks that help visitor orientation and direction giving can be fundamental for this purpose (Marquardt,2012).The ability to navigate spaces independently, safely and efficiently is a combined product of motor, sensory and cognitive skills (Lahav&Mioduser, 2003).

Designers must remember or as constant practice that spatial learning and thinking are not the same as visual learning and thinking. In addition to spatial perception, cognitive mapping involves use of other sensory inputs, integration of inputs over time, movement, input from other knowledge and value systems, and frameworks for spatial learning gained

early in life in Downs &Stea (cited in hunter, 2010).It is through exploration, route planning and other forms of navigation that we are able to manage and use spatial information to its full extent (Molly, Stephen &Hirtle, n.d.).

2.4 Principle of Way-Finding

According to Hunter, (2010) human psychology, occupant satisfaction, health, long-term performance, and the financial bottom line, inattention to way-finding reduces the inclusiveness of buildings for everyone. Understanding a few basic principles of architectural way-finding design can help designers to enhance building performance and to provide more all-encompassing solutionsEvans and McCoy, (1998). Good architectural way-finding design is important to universal design because it facilitates user access, increases satisfaction, and reduces stigma and seclusion of users with disabilities (Hunter, 2010b). It minimizes the confusion of visitors and mistakes by employees, saving time and money and preventing accidents. It also minimizes stress, boosting health, and productivity (Evans,& McCoy, 1998). “The ability to find one’s way into, though, and out of a building is clearly a prerequisite for the satisfaction of higher goals,” is according to designer (Weisman, 1981) cited in Hunter (2010).

Way-finding refers to techniques used by people who are blind or visually impaired and visually abled person to move from place to place independently and safely Apelt, Crawford, & Hogan, (2007). Way-finding principle is typically divided into two categories: 1). Orientation and 2). Mobility. Orientation concerns the ability for one to monitor his or her position in relationship to the environment; and mobility refers to one’s ability to travel safely, detecting and avoiding obstacles and other potential hazards. Weisman, (1981) In

general terms, way-finding is the ability to know where you are, where you are heading, and how best to get there; recognize when you have reached your destination; and find your way out all accomplished in a safe and independent manner.

Principle for effective way-finding including:

1. Create an identity at each location, different from all others.
2. Use landmarks to provide orientations cues and memorable locations.
3. Create well- structured paths(Passini,& Arthur, 1992)
4. Create regions of differing visual character (Chao, 2004)
5. Use survey views (give navigators a vista or map).
6. Provide signs at decision points to help way-finding decisions(Huelat, 2007)
7. Use sight lines to show what's ahead.

2.5 Signage as a tool for Way-Finding

According to Encarta, (2009) signage symbolic device be it signboard, reflective objects or sign post use to show direction to moving or standing object. Pavement markings separate opposing streams of traffic and direct vehicles, pedestrian and cycles into proper positions on the roadwayas shown in figure 2.1. Pavement markings delineate turn lanes at intersections and establish no-passing zones.

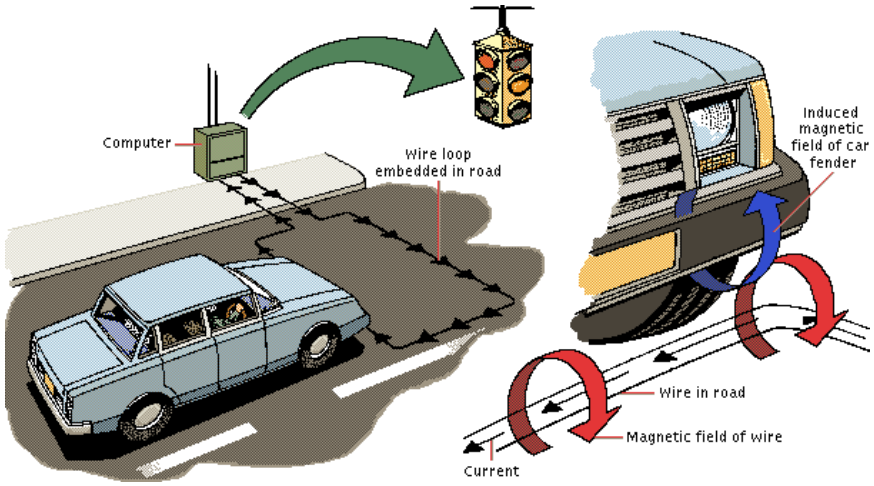


Figure 2:1: Signage as a tool for-way-finding
Source**:** Encarta2009

2.5.1 Cognitive Mapping as tool of Mobility

Research on visual impair person's motion in known and unknown spaces Golledge, Klatzky, Loomis,Ungar, Blades & Spencer,(as cited in Lahav, 2003) indicates that support for the acquisition of spatial mapping and orientation skills should be supplied at two main levels: 1). Perceptual and 2). Conceptual at the perceptual level, the deficiency in the visual channel should be compensated with information perceived via other senses. Via sense of touch and sense of hearing become powerful information suppliers about recognised and, unrecognised surroundings.The ability to travel autonomously relies on mastering orientation and mobility, orientation and locomotion requires specialized training provided by orientation and Mobility instructorsas shown in figure 2.2. Orientation refers to the perception/knowledge of the spatial relations between the traveller and significant space features used as landmarks or directional clues (spatial updating); while mobility refers to the ability of moving safely, by the mastery of walking, detection, and avoidance of obstacles (Jansson, 1990) cited in (Gaunet, &Briffault, 2005)as shown in figure 2.2.

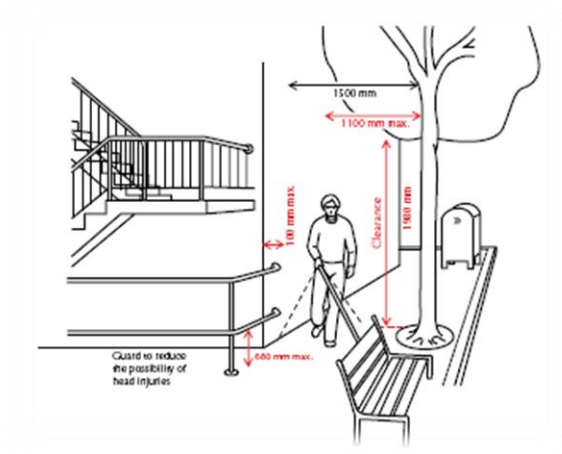


Figure 2:2 Cognitive Mapping as Tool of Mobility
Source: design for independence and dignity for everyone: vision, hearing, communication, mobility, cognition. (2008) 4th edition.

2.5.2 Tactile ground surface indicator (TGSI)

According to Durdin& Hughes, (2003) TGSI are textured surface features built into or applied to walking surfaces. They provide blind and vision-impaired pedestrians with visual information and sensory information underfoot. The two types of TGSI are Warning Indicators and Directional Indicatorsas shown in plate 2.1.



Plate 2:1 Directional indicators
Source: design for independence and dignity for everyone: vision, hearing, communication mobility, cognition. (2008) 4th edition.

Warning indicators consist of a series of truncated domes and alert blind and vision impaired pedestrians to pendingobstacles or hazards on the continuous accessible path of travel that could not reasonably be expected or anticipated using other tactile and environmental cluesas shown in plate 2.2. Warning indicators act much like a stop sign, indicating to blind and vision-impaired pedestrians that they should stop to determine the nature of the hazard before proceeding further. They do not indicate what the hazard will be. Directional indicators consist of a series of raised bars and give directional orientation to blind and vision-impaired people and designate the continuous accessible path of travel when other tactile or environmental clues are missing (Durdin& Hughes, 2003). When combined with other environmental information, TGSI assist blind and vision impaired people with their orientationas shown in plate 2.1.



Plate2:2 Warning Indicator
Source: Road and traffic guidelines RTS 14 Guidelines for facilities for blind and vision-impaired pedestrians 2nd edition 2007

2.5.3 Colour as tool for Way-finding

Colour works as an environmental information tool for user's successful way-finding abilities (Read, n.d).

According to Helvacioğlu&Olguntuk, (n.d.) opined that colour can be used as a visual clue to help individual's focus on a particular area of the built structure. In buildings, colour can be used to break the monotony and different spaces that can be enhanced with their colour schemeRead,(n.d). This way, colour can help cognitive mapping by marking varying ambiences of different spaces in a building. Colour-coding should be carefully applied and colours should be sparsely usedMarston, (2002). Colour should not override the overall atmosphere, but instead should be a part of the overall ambience. When landmarks are concerned, colour can help visibility of those. Colour can also help associating a space with a particular landmarkMau, Nik, Makatchev, &Steinfeld (2012). It should be noted that memorability of colour is limited to only first and second landmarks or prominent colours seen, so it is best to make only one or two colours dominant for way-finding purposesFoster &Noe (2008). Lastly, it is important to always remember that colour is all about materials, as all materials come with a particular colouras shown in plate 2.3.

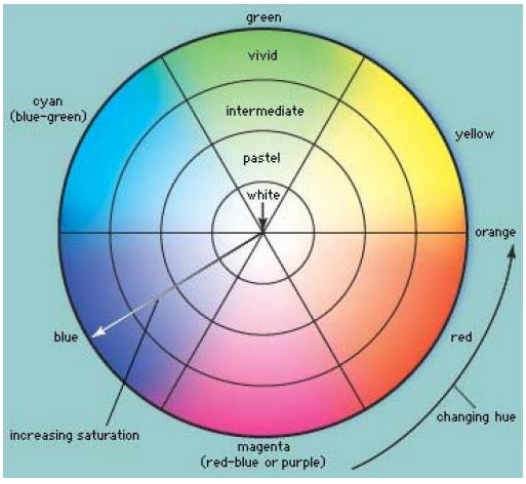


Figure 2:3 Colour schemes
Source: www.google.com/colourschemes 2015

2.5.4 Use of animals for Way-finding

The common mobility aid for a blind or vision-impaired person is a guide dog(Andrew&Szeto, 2006). According to Durdin& Hughes, (2003) A guide dog is trained to lead its owner around obstructions and to stop at distinct changes of level however guide dogs are generally unable to respond to changes in texture or colour underfoot as shown in figure 2.4.

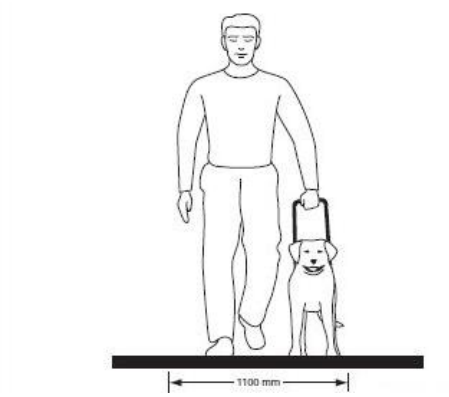


Figure 2:4 Use of Animal for way-finding
Source: City Of Toronto accessibility Design Guidelines

2.5.5 Sense of Touch or Haptic Information

In addition, haptic information appears to be essential for appropriate spatial performance. Haptics is defined in the Webster dictionary (Webster, 1983) as: 'of, or relating to, the sense of touch.' Fritz, Way &Barner, (1996) define haptics as follows: 'tactile refers to the sense of touch, while the broader haptics encompasses touch as well as kinetic information, or a sense of position, motion and force.' For the blind, haptic information is highly importantas shown in figure 2.5.

Research by Glenn &Chignell, (1992) has suggested that landmarks may be particularly visual or cognitive, and that these functions are intricately tied as parts of a symbol system.

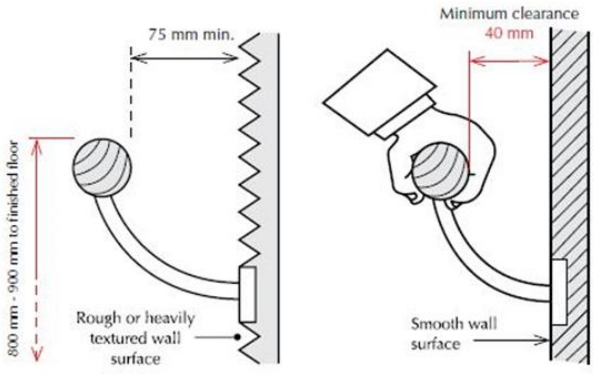


Figure 2:5Haptictools
Source: City Of Toronto accessibility Design Guidelines 2008

2.6 Benefits of Good way-finding for visually impaired

Holscher, Meilinger, Vrachliotis, Brosamle,&Knauff (2007)opined that many people have problems finding their way around public buildings such as airports, hospitals, offices or university buildings.Way-finding as categorized by (Passini and Arthur, 1992).

I. Reduction of stress and frustration for the visitor.
II. Functional efficiency.
III. Visitor accessibility.
IV. Safety.
V. Patient empowerment, improving cognitive skills in spatial understanding.
VI. Improved bottom line.

Clearly then, an upright way finding system is critical to healthcare facilitiesKroll (2004). But how can the confusing, complex, and often hostile environment of the healthcare facility be transformed into a space with user-friendly, easily understood, manageable, and

intuitive way finding. One needs to know the spatial relations between self and object as well as updating that to perform an efficient way-finding (Turano, Yu, Hao, & Hicks,2011).

2.7 Visual Impaired Person

A report by World Health Organization (WHO) and International Agency for Prevention of Blindness (IAPB), as cited by Nada, Fakhr, &Seddik, (2014) stated that there are approximately 285 million persons around the world who are visually impaired, out of which 39 million arelegitimatelymedically proven that they are completely blind. Africa and other developing countries represent 90% of this statistics.

According to WHO and IAPB, as cited by Nada, Fakhr, &Seddik, (2014) the number of blind people will increase worldwide to reach the double by 2020. According to world health organization, (2007) Over 75% of the people in the world who are legitimatelymedically proven that they are blind have some residual vision, 11.5 million people have some degree of visual impairment. According to world health organization, (2011) predictably, disability is not randomly distributed across the population.

Regardless of loss of vision or being visually impaired, obtaining information from the environment through which navigation is performed is important for commuters and would be a prerequisite for them.

Schools for the blind were established in the United States during the first half of the 19th century not to segregate children, who were blind, or to shelter them, or even to provide care for them Ferrell, (2007). They were established with the belief that children who were blind and visually impaired were capable individuals who could become contributing members of society. Committee of disabled people's rights, (2001) has Mandate

educationist**,** education board in UN as well as universal at that time, and many children with and without disabilities were not attending school. Schools for the blind were thus affirmations of the potential of blind children in a society that had not yet come to adopt education as a social and political goalFerrell, (2007), & Committee of disabled people's rights, (2001). Blind children had not been excluded from education in the same manner that other children with disabilities were; there was never a sense that education of students with visual impairments was a waste of time or moneyrather, time and money were an investment in the futureworld health organization, (2011).

Blind is part of different ability, community where blinds have different way to solve a problemas shown in Plate 2.3. It can be defined as a group with significant limitation of visual capability that can be caused by illness, trauma, a derivative or degenerated condition that cannot be corrected by conventional means, including medical or surgical means (Kurniawan, Maharani, &Rahmawati, 2011).

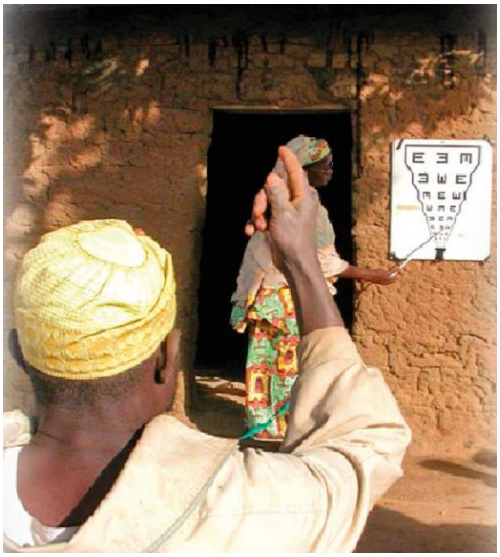


Plate 2:3: Visual Impaired Person
Source: The Nigeria national blindness and visual impairment survey 2005-2007

2.7.1 Categories of visual impaired

World Health Organization categories of vision loss were used to define blindness and severe visual impairment, allowing international comparisons to be made.

Blindness: A presenting visual acuity (VA) with glasses for distance if normally worn or unaided if glasses for distance not worn of 3/60 in the better eye.

Severe Visual Impairment (SVI): A presenting VA of 6/60 to 3/60 in the better eye.

Moderate Visual Impairment (Mod VI): A presenting VA of 6/18 to 6/60 in the better eye.

Mild Visual Impairment (Mild VI): A presenting VA of 6/12 to 6/18 in the better eye.

Normal (N): A presenting VA of 6/12 in the better eye.

2.7.2 Historical of aid for peoplewith visual impairment in Nigeria

According to interview with the principal of SBC Gindiri (2015) effort by Gen. Yakubu Gowon GCFR to make little liberation of the visual impaired person, the transformation of facilities used by visual impaired person has not yet reached a considerable degree that will allow person move without help. The actual formal education of the visually impaired persons startedin the 1940s in Nigeria by the Sudan interior Mission that was a century after their sighted counterparts had embraced Western Education. The main aim of the Missionaries was to train persons with Visual impairment to read the Bible and learn skills which would make them to be self-reliant. The establishment of the first school for the blind in Gindiri was a step to the emergence of other special education institutions in

Nigeria. It is difficult for blind people to move or live without help. So, they usually use white cane to guide them during moving. Although it might be helpful, it doesn't guarantee saving blind people from risks. These traditional ways can be used for low-level obstacles detection only.

2.7.3 Visual impaired person's Management in African Society

Aiwa, (n.d.) opined that African cultural beliefs and attitudes of parents towards disabilities including vision impairment will not be an easy task. However, the following recommendations could be considered:

1. We must find effective and efficient ways to bridge the communication gap between medical and traditional understanding of disabilities and culturally held supernatural beliefs of the causes of these disabilities (Adebiyi, 2007).
2. There is a greater need for awareness in local areas on the importance of accepting children with disabilities and how to include them in all activities in the communities and their right to an education (Adebiyi, 2007).
3. Parents, teachers and government must be encouraged and supported with resources to take an active role in the education of disabled children.
4. Parents with positive and caring attitudes are usually the most successful and often the most influential parents. It is parents with this kind of attitudes that will help the disabled children to do well academically at school and be useful and active members of the society (Mau, Nik, Makatchev, &Steinfeld 2012).

2.8 Statistic of abled and disable person in world

In 14 countries of Union of Europe in the year 2000, according to statistic Council of Europe Disability reports, about 13 per cent of the population are still partially visually disabled and again women more than men are disabledas shown in figure 2.6European Committee reports,(2012) that the reason for this difference is probably related to different cultural perceptions, levels of awareness, quality and integration of disabled people in society. However, many people with visually impaired in Europe are experiencing forms of exclusion by the side of society(WHO EU data on blindness for 2009).The present in Nigeria survey showed that the prevalence of blindness among those aged ≥50 years was 5.47% (Kyari, Gudlavalleti, Sivsubramaniam, Abdull, Entekume,& Foster, 2009).

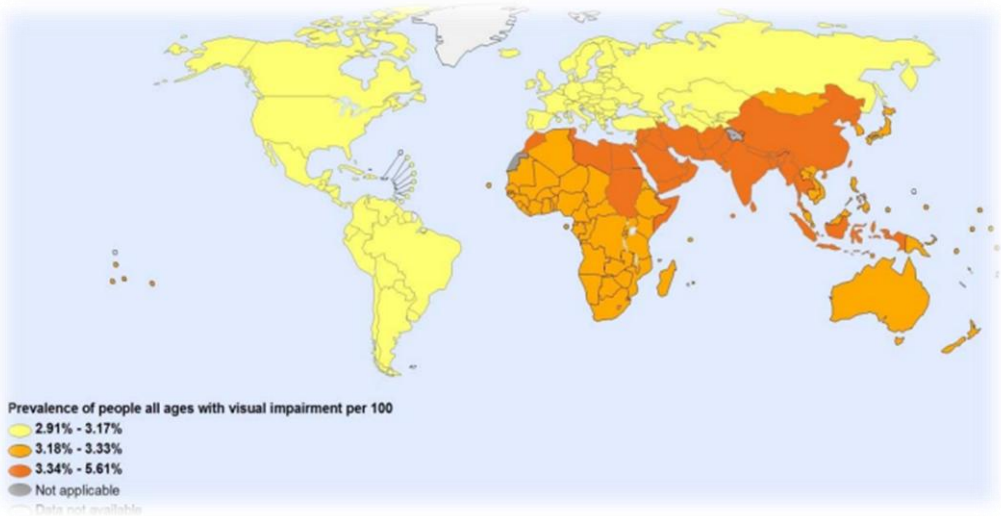


Figure 2:6World Maps
Source: Global estimates of visual Impairment: 2010, S.P.Mariotti, D. Pascolini, Br J. ophthalmology. 2012 may; 96(5):614-8

2.8.1 Statistical distribution of visual impairment in Nigeria

The country is officially call Federal Republic of Nigeria with a population of about 138,283,240 (2006 NPC census) with estimated growth of 2.38%.With this number and population growth Nigeria is the most populous black nation in the surface of the earth, thefederal republic of Nigeria has a land mass of about 923,768 sq. km or 356, 669 sq. mi, with a capital city as Abuja. The nation has 36 states with it capital Abuja; it is divided by a political zone of north-west, north-east, north-central, south-west, south-east and south-south.The north-west has visual impaired population of 323,764 persons; the north-east has visual impaired population of 221,993 persons; the north-centralhas visual impaired population of 180,851 persons; the South-west has visual impaired population of 150,930 persons; the south-east has visual impaired population of 126,039 persons; and the south-south has visual impaired population of 122,365 personsas shown in figure 2.8 andTable 2.1.

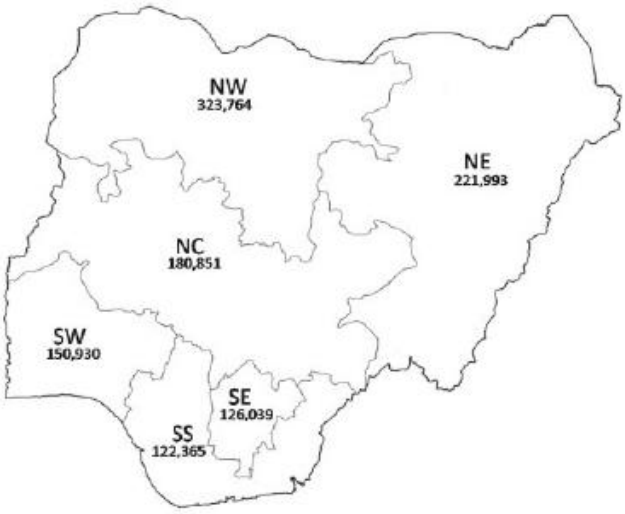


Figure 2:7estimated number of blind adult in different geo-political zones in Nigeria

Source: The Nigeria National Blindness and Visual Impairment Study Group Prevalence of Blindness and Visual Impairment in Nigeria (2009): The National Blindness and Visual Impairment Survey:iovs, may 2009, vol. 50, no. 5.

Table 2.1 Distribution of Nigeria population based on projections from the 1991 census

s/no	Geo-political zone	Total population	% of total in each geo-political zone	Estimated population≥40 years	%≥40 years	Sample size ≥40 years
1	North-central	18,312,959	13.7	2,981,514	13.2	2,027
2	North-east	22,211,520	16.6	3,806,234	16.8	2,588
3	North-west	30,120,187	22.5	5,147,360	22.8	3,499
4	South-east	16,194,215	12.1	2,620,756	11.6	1,782
5	South-South	20,221,525	15.0	3,290,629	14.6	2,237
6	South-west	26,237,689	19.6	4,657,051	20.6	3,166
7	Abuja	558,829	0.4	112,335	0.5	76
total		133,856,924	100.0	22,615,879	100.0	15,375

FCT= Federal capital territory

Source: The Nigerianational blindness andvisual impairment survey2005-2007

2.9 Cause of Visual Impairment in Nigeria

In total visual loss for example there may be total darkness of the visual field. Other types include visual impairment in Glaucoma, age-related macular degeneration and so forth (retrived on 2015-07-12 19:39 from http://www.news-medical.net/health/types).

Socio-economic development, investment in health and visual impairment, in the low and middle income countries group the prevalence of VI prevalence is higher as shown in Figure 2:9.

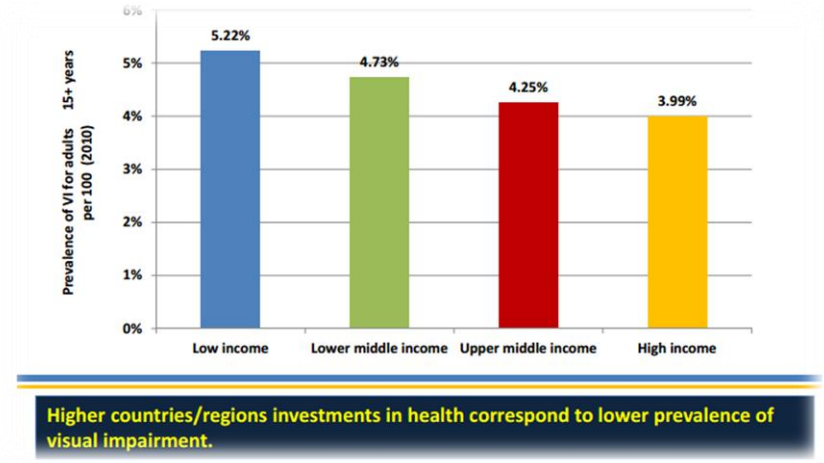


Figure 2:8 Rate of Prevalence of Impairment
Source: visual impairment and blindness 2010; world health organisation sponsors.

2.9.1 Ecological Zones and Blindness

There is a considerable body of evidence that ecological factors such as rainfall, temperature, vegetation, humidity, topography, altitude etc. are associated with eye diseases, particularly those caused by infectious agents as shown table 2.2. Ultra violet (UV) radiation has been postulated to be a risk factor for cataract and it has been shown that the intensity of UV radiation varies by latitude and altitude (Seckmeyer,Pissulla&Glandorf, 2008).

Table 2.2 Prevalence of blindness and visual impairment across the ecological zones

Eco-logical zones	Examined	Normal/ near normal (≥ 20/40)		Mild VI* (< 20/40-≥20/63)		Mod VI† (< 20/63-≥20/200)		Severe VI± (< 20/200-≥ 20/400)		Blindness (< 20/400)	
		N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]	N	% [95% CI]
Sahel	256	188	73.4 [70.1-76.5]	18	7.0 [4.7-10.3]	29	11.3 [9.1-14.0]	4	1.6 [0.6-4.0]	17	6.64 [4.2-10.4]
Sudan savannah	5,328	4,173	78.3 [76.4-80.1]	350	6.6 [5.8-7.5]	462	8.7 [7.7-9.7]	78	1.5 [1.2-1.8]	265	5.0 [4.3-5.7]
Guinea forest savannah	3,453	2,676	77.5 [75.4-79.4]	258	7.5 [6.5-8.5]	318	9.2 [8.0-10.5]	62	1.8 [1.3-2.4]	139	4.0 [3.2-5.0]
Rainforest	3,220	2,420	75.2 [72.8-77.4]	269	8.3 [7.4-9.4]	390	12.1 [10.6-13.8]	37	1.1 [0.9-1.5]	104	3.2 [2.6-3.9]
Delta	1,334	996	74.7 [71.6-77.5]	107	8.0 [6.5-9.9]	165	12.4 [10.3-14.8]	22	1.6 [1.1-2.4]	44	3.3 [2.4-4.5]
Total	**13,591**	**10,453**	**76.9 [75.8-77.9]**	**1,002**	**7.4 [6.9-7.9]**	**1,364**	**10.0 [9.4-10.7]**	**203**	**1.5 [1.3-1.7]**	**569**	**4.2 [3.8-4.6]**

Source: The Nigeria national blindness and visual impairment survey 2005-2007

2.10 Prevalence's in Nigeria

National surveys in Nigeriahave been undertaken in only a few zones, such as North-east, North-west, North-central, and South-east(Kyari et al 2005-2007). The study showed that 1.0 million adults aged 40 years in Nigeria have moderate or SVI or blindness as shownin table 2.3.

Table 2.3Estimated number of visual impaired and blind person aged ≥40 years in the GPZs

	Blindness			SVI			Moderate VI		
GPZ	Prev. (%)	Estimated No.	95% CI	Prev (%)	Estimated No.	95% CI	Prev. (%)	Estimated No.	95% CI
North West	4.84	323,764	270,765-385,756	1.48	98,618	74,878-129,700	8.27	552,632	483,365-630,447
North East	6.14	221,993	171,076-286,814	1.39	50,263	34,721-72,698	10.89	393,725	330,577-466,932
North Central	3.75	180,851	142,916-228,376	1.72	83,287	56,973-121,189	7.10	342,665	278,107-421,023
South West	2.79	150,930	120,813-187,991	0.88	47,662	31,422-72,054	9.64	522,300	452,371-601,898
South East	4.63	126,039	98482-160,781	2.05	55,654	39,991-77,262	13.12	356,839	298,166-424,941
South South	3.24	122,365	89,515-166,943	1.78	67,301	47,213-95,558	13.71	518,012	444,931-600,543
Nigeria	4.19	1,132,295	1,027,738-1,246,808	1.49	403,965	351,595-465,187	10.04	2,714,324	2,542,299-2,896,598

Source: The Nigeria National Blindness and Visual Impairment Study Group Prevalence of Blindness and Visual Impairment in Nigeria (2009): The National Blindness and Visual Impairment Survey:iovs, May 2009, vol. 50, no. 5.

The WHO global data on blindness for 2002 categorized Nigeria along with a group of other countries in the region as having an estimated prevalence of blindness of 9% among those aged 50 years and 1% for the population of all ages. The present survey by Kyari et al., (2009) showed that the prevalence of blindness among those aged 50 years was 5.47% and therefore it may be necessary to revise the WHO estimates of blindness in Africa.

The risk factor is chances or possibly in which an individual can possibly get contact with eye-relate problem that can make the individual blind as shown in table 2.4.

Table 2.4: Risk factor based on age

AGE (Y)	BLINDNESS	ADJUSTED OR (95%CI)
40-59	93	
60-69	131	4.5(3.3-6.1)
70-79	182	11.3(8.6-15.0)
>80	163	28.1(20.7-38.1)
Risk factor based on gender		
Male	248	28.1(20.7-38.1)
female	**321**	**1.3(1.1-1.6)**
Risk factor based on geo-political zone		
GPZ	**76**	**Reference**
South west		
South east	77	1.5(1.1-2.1)
South south	60	1.3(0.8-1.9)
North central	76	1.6(1.1-2.3)
North west	174	2.5(1.8-3.4)
North east	106	3.2(2.2-4.7)
Risk factor based on plate of residence		
PLACE OF RESIDENCE		
Urban	117	Reference
Rural	452	1.0
Risk factor based on plate of residence		
LITERACY		
Read & write easily	43	Reference
Read & write with difficulty	78	1.7
Illiterate	446	2.1

Source: The Nigeria National Blindness and Visual Impairment Study Group Prevalence of Blindness and Visual Impairment in Nigeria (2009): The National Blindness and Visual Impairment Survey: iovs, May 2009, vol. 50, no. 5.

2.11 Intervention forVisually Impaired

The use of various objects tools to salvage the visual impairment has being improve year in year out, despite their disability the tent to move round a facility without any hitches or trouble when changes place of aboardFoster &Noe, (2008). AccordingMarston, (2002) to itprovides the ability to test blind subjects transferring between four different transits modes in an area that had 51 talking sign transmitters as shown in figure 2:10

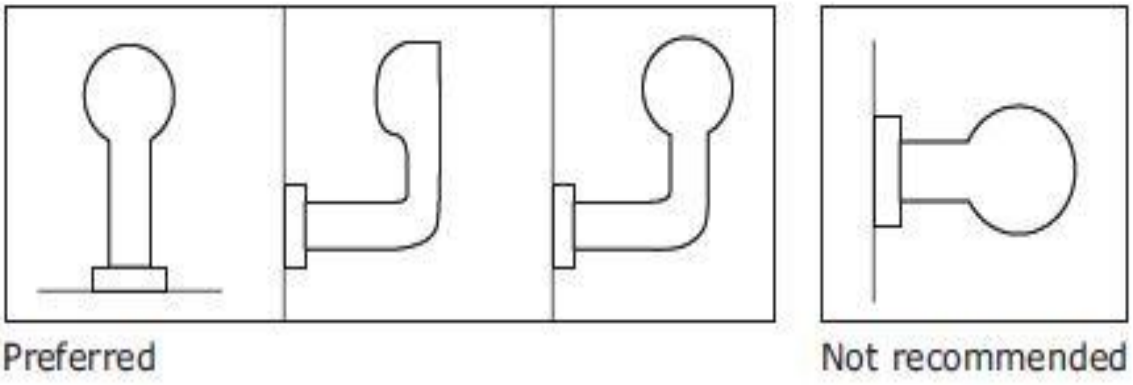


Figure 2:9Hand Tools
Source: City Of Toronto accessibility Design Guidelines 2013

2.12 Summary of Literature Review

Way-finding is one of the architectural principles that serious consideration has to be given to achieve smooth transitions from one place to another without missing one's way. Series of research work have been done but most Nigerian Architect doesnot care to check what is obtainable in order to burst their design and to inculcate good way-finding techniques to their design. Architects and designers need to take serious concern for inclusive approaches to way-finding and learn more about the psychological impacts on blind person within his built space.

Understanding a few basic principles of architectural way-finding design can help designers to enhance building performance and to provide more encompassing solutions. Good architectural way-finding design is important to universal design because it facilitates user access, increases satisfaction, and reduces stigma and seclusion of users with disabilities. Way-finding refers to techniques used by people who are blind or visually

impaired as they move from place to place independently and safely. Way-finding is typically divided into two categories:

1. Orientation
2. Mobility.

Use of symbols, sign and signage enhance movement for both the visual abled and the visually impaired cognitive mapping is the ability of one's brain to recall and get acquainted to new environment without serious stress or challenge, use of various techniques like warning and directional tactile ground signs are good techniques that help blind person and use of animal's maps and several others.

At this time, the tragedy developments brought to us as generation are; war, terrorism, natural disasters and several of their kind. Other crisis has caused disability to be presented as a potential threat to the public. On the other side the needs of disabled people distinct indicators should be provided so as to give them sense of belonging in our society.

Even though much has not been done about person living with disabilities in this part of the world, the researcher felt that in the area of visual impairment successive government have done much by construction of schools, and several basic amenities they can use to live a good life within a society but never put the user in mine. This knowledge obtained from this studying will push the researcher to design space as a model that will give every visually impaired person good access to all space without being secluded or help by visually able person.By providing tactile ground indicator, provide plants, landmarks, signage, and several items that the research dims fit.Architect should as a matter urgency design with some consideration of visually impaired and physically challenge person.

Hunter (2010) posit that human psychology, occupant satisfaction, health, long-term performance and the financial bottom line, inattention to way-finding reduces the inclusiveness of buildings for everyone. In other that this may be achieved within any building typology government, cooperate bodies and developers most put serious considerations in place to achieved good way-finding in buildings.

The statistics based on Kyari, et al. (2005-2007)North Western Nigeria has seven stateswhich comprises of Jigawa, Kaduna, Kano, Katsina, Kebbi, Sokoto, and Zamfara which based on 2006 Nigerian census has the majority of Nigerian populations pulled a total population of 323,764 visual impair persons, follow by the North East which has 221,993visuallyimpairment personscomprising of six state Adamawa, Bauchi, BornoGombe, Taraba,and Yobe states which is fourth most populated zoned in Nigeria on same census and thirdly the other Northern zone which is North Central has the majority of the visual north central 180,851, these zone comprises of Benue, Kogi, Kwara, Nasarawa, Niger, and Plateau. The north has the largest population as well as land mass and harbour about 563, 842 visually impaired persons as of 2007 Kyari's report.

In view of the large casualty cases in the north, the researcher deems it fit to carry his research work in the zone,that is why the researcher wants to conducted the research within the Northern part of the country due to high level of visual impairment in the zone. The research is descriptive and exploratory based to achieve this variable of research, variable 1. Cognitive mapping skills; 2 Use of animal e.g. dog;3 tactilesurface ground information;4.Haptic information; 5 Plantation of aromatic plant;

2.13 Conclusions

Good architectural way-finding design is important to universal design because it facilitates user access, increases satisfaction, and reduces stigma and seclusion of users with disabilities. Provision of certain element enhances orientation and mobility. Provision of element identifiable at each location, different from all others makes visually impaired person recognised his immediate environment. What types of landmarks to provide orientations clues and memorable locations which will aid visually impaired navigate through building space? Construction of well- structured paths, to serve as good tool for guild. Signage as a tool for Way-finding providing symbols at strategic points to aid mobility for visually impaired. Tactile ground surface indicatoris like a rough surface floor finished that provides a sense of sensations under the foot indicate cautions ness when walking. Animalscan be used for good Way-finding to navigate through space. Sense of touch from either a leading walls or rail to a specify direction.

At such when considering the design of the eye centre setting measure should be considered the age of the user; nature of their ailment; literacy level; gender; and place of residence.

3.0 RESEARCH METHODOLOGY

3.1 Introduction

Afolayan, (2007) cited in Ujo,(2002) sees methodology as the operational outline of what the researcher plans to employ in achieving the objective of his study. Obeka, (2011) observes that research is a process.According to Issa, (2004) as cited by Shittu, (2015) states the purpose of research methodology is to provide a detailed elucidation on the procedures to be used in carrying out the research.Methodology can be seen as the master plan, to be followed in the conduct of a study (Shittu, 2015). It usually comprise of the following:Introduction; Research Design; Population of the Study; Sample and Sampling; Techniques/Techniques; Instruments for Data Collection; Procedure for Administration of Instruments; Data Analysis ProcedureAwolola (2000).This chapter pursues to Addressing way-finding techniques for visual impaired person forthe design of eye-centre, Jalingo.

3.2 Research Design

According to Issa, (2004) as cited by Oshodi (2007);Shittu, (2015) research designis a blue print for carrying out research and it includes the list of what the researcher will have to do, from hypothesis to data analysis and conclusion.

There are various means of conducting research in field of science, behavioural science, and several others all is accepted provide that the research follow a logical arrival to portray logical data collections, analysis of the collected result, presentations of result and subsequently, systematically conclusions as, opined by Aina (2001) as cited by Shittu, (2015).

Thestudy of previous research on way-finding, survey research was more adequate due to the fact; the researcher cannot reach each and every member of the population. As a result a purposive random sample is selected to symbolize the whole population. The results obtained from the sample will be used to generalize the population. Thus, sampling techniques was used to determine the appropriateness of the sample. The used of questionnaire, interview, focus group discussion,checklist and visual survey will be used for data collections instruments to get good and acceptable result for the study.Descriptive Survey research is used to quantitatively describe specific aspects of a given population also survey research the data required for survey research are collected from people even though the result is subjective. The major factors that influences the selection of a particular research method time constrain and wide opinion of individuals.

Finally the studyadopteddescriptive survey, questionnaire survey, and case study surveymethod which is the most appropriate method for these study "Addressing way-finding techniques for visually impaired persons in the design of eye-centre", to gather information about characteristics, actions, or opinions of a large group of people or to measure the needs, and examine effect of survey method is the best approachAbdullahi, (2011). In this method the opinions of individuals on a particular problem is sought, whereby the compromise of these opinions provides the needed solution to the problem at hand.

The primary research designs used for data collection in this study are;

I). Case study; II).Survey and Observations; III).Administration of questionnaire; IV).Interview (key informant are blind staff and specialist in special education in the schools visited) and V). Focus group discussion

Case studyconducting physical site measurements, photography and documentation of existing items good or damaged on site, the case study is descriptive in nature. Descriptive research design is a careful and procedural observation of events. The survey type of descriptive research design was used in which only part or sample of the population was studied and the selection is made such that the sample represents the whole population Okafor, (2002). Case study: This involves the physical visitation of the two schools and eye centre by the researcher and these factors are put to considerations: a). Site planning and landscape. b). Spatial organisations. c) Building form and expression. d). Building technology and materials. e). Building services.

3.3 Population of Study

In cognisance of the scope of study the targeted populationcomprises of two schools for the blind School for the blind children (SBC), government vocational training centre (GVTC)and, onehospitalNational eye centre Kaduna.

3.4 Sample and Sampling Techniques

In this study, purposive and random sampling was used. Due to the fact that most sample most is item considered valuable to research findings. Kothari, (2004) defines purposive sampling as picking based on purpose and exclude all that will not affect the result;the purposive and random sampling method was used to ensured that all visually impaired school was chosen due to the peculiarity of the study, where blind person are given an equal opportunity randomly of being included in the sample every element in the population have equal and independent chance of being included in the sample.

The formula established that if the sample frame is not known, then a sample size of (5%-10%) is considered adequate (http://www.ReportBD.com) as cited in (Abdullahi, 2011). The sample frame of a thousand visually impaired was considered which 10% of them was amount to 100 persons, hundred person was not obtained due to ability to read and write in braille finally 80 respondents from SBC and GVTCwereselected using purposive and random sampling from about a population of 1000 visually impaired that were present in the schoolsabove age 15 years. Therefore, a sample size of 1000 populations will be used for the study. The formula used to arrive at this number that is 100is (10% of the total population).

3.5 Instruments for Data Collection

Three instruments that were used for collection of data for the studyare: I). Questionnaire, II). Interview schedule with key informant i.e. staff, and student III).Case study inSBC, GVTCand NEC.Questionnaire was used because large number of people opinions is required in just limited time for the analysis Eiselen&Uys, 2005. Interview wasalso used as it allows for in-depth information about how; things are done the way it was done and how it can be improve and focus group discussion. Physical observation was employed in assessing the state of facilities in the NEC, SBC,and GVTC. The three (3) instruments used were designed in concurrence with the objectives of the study.

3.6 Procedure for Administration of Instruments

Letter of introduction wascollected(see appendix 1; 2; and 3) fromthe department of Architecture Ahmadu Bello University, (A.B.U) addressed to the two head of schools and chief medical director, and however, it is evident that the entire visually impaired person

cannot read the print questionnaire so, the questionnaire is being translated (encode) to braille for easy read and fill of the questions, as a result the data were collected in the form of type writer print out. In some cases interviewer assisted is also employed to enable the researcher get a viable responses. Focus group was also beingcarried out to collection information from the un-educated once.

3.7 Data Analysis Procedure

The information of this research was obtained from the following procedure for data collection.

I. Visualsurvey: This will be done by looking and identifying elements on and around the existing schools and hospital, and use of checklist based on: a). checklist b). Photographs, c). Documentation/ note takingand d).Sketches.

II. Focus group discussion: a). structured Interview b). Semi-structure interview c) unstructured interview.

3.8 Data Presentation Method / Analysis

An outcome, especially the final score of the study wasgraded on likert scale. Something that follows as a consequence of another action, thus, data gathered from the field survey was collated and analysed statistically.Subsequently results werebeing presented with the aid of charts; (barchart, piecharts, and histogram), graphs, tables, figures and plates.

3.9 Conclusion

At the end of the study addressing way finding techniques for visually impaired in the design of an eye-centre, Jalingo, methodology the master plan, of research to be followed in the conducting of the study in behaviouralscience, it is a blue print for carrying out research and it includes the list of what the researcher will have to do, from hypothesis to

data analysis and conclusion. Research design this the most important aspect of the study which explained/narrate how, why, and what the research will cover and how it cover why it cover, type of research survey research was adopted because it large information in limited time due to questionnaire. Population of study comprises of two schools for the blind with 1000 students which 80 student was use as responded due to the ability of reading and writing and age 15. The purposive random sampling method will be used to ensure that all visually impaired school was choosingbase on purpose and unsystematic due to the peculiarity of the study.Letter of introduction was collected addressed to the two head of schools and chief medical director and subsequently permission was granted, and outcome, especially the final score of the study will be graded and analyses.

4.0 CASESTUDY

4.1 Introduction

This chapter shows in detail is obtainable in the case study area (schools in which person's with visual deficiency are admitted SBC and GVTC and National eye centre Kaduna NEC) purposively & selected so that the research will be conducted.

4.2 Case Study 1: Brief history of the school for the blind childrenGindiri

School for the Blind Children Gindiri Located in MangуLocal government Area of Plateau State, the School is one of Nigeria's foremost special schools established to carter for the educational needs of visually impaired children.

The school was established in 1953 by the then Sudan United Mission British branch (SUMB) as part of efforts aimed at ensuring that visually impaired children in Nigeria have increased access to quality education (Adebiyi, 2007). Sixty two years later, the Church of Christ in Nigeria (COCIN) and other Disability Rights Groups like centre for blind movement (CBM) have played important role in ensuring that the school remains relevant in the educational and Economic development of hundreds of visually impaired youths in Nigeria.According toLahav, &Mioduser, (2003)Education for the Blind has changed dramatically since School for the Blind opened its doors sixty two years ago. Today the school has an enrolment of over 70 children with various degrees of visual impairment; they come from different communities in the country but have one goal; to become their dreams despite their challenges (Golledge&Stimpson 1997).

The students live in a hostel facility and are supported by school teachers and other older student to learn the activities of daily living like movement and fetching and using water among others.

4.3 Spatial Organisation(S.B.C.) Gindiri

The school for the blind children (S.B.C) design did not consider the organisations of space in order of hierarchy to accommodate (visual person's) it user, all the planned were built not following any pattern rather buildings were just built to help the immediate need at that particular period in time as shownfigure 4:1.



Figure 4:1 SBC site mapGindiri
Source: Google image 2015

4.4 Building Circulation(S.B.C.) Gindiri

The School for the Blind Children (S.B.C.)Gindiri is a school with large land mass with buildings scatter around the large area. The SBC Gindiricomprises of administrative block, dining halls, assembly halls,class room, and emboss/technical units, the administrative units comprising of headmaster, deputy headmasteroffices, staff room, and some offices like

embosser machine room where the machine use for encoding writings to braille, assembly hall, were student come for assembly and any gathering, dining hall,were the go to eat and hostels (male and female)as shown in figure 4:2.



Plate4:1 Circulations within SBC Gindiri
Source: Author's fieldwork 2015

These are views of existing class room and a large undefined roads and sparse green cover within they school campus. Movement are not restricted with defined roads or paved area.There are large unplanned roads and large circulation even though the school did not considered the visual impaired in the design and construction, road and circulation was made as people match the unplanned areaas shown in plate 4:1.



Plate 4:2A View of Class
Source: Author's fieldwork 2015

4.5 Architectural Character

The buildings in S.B.C. Gindiri were design with Nigerian old traditional methods of construction i.e. use of mud walls wooden column. The schools had some traditional constructions materials like alu-zinc roof sheets,mud walls, louvers windows, wooden column of 50mm x 50mm and doors floor and finishes.

4.5.1 Roofs of S.B.C. Gindiri, Mangu

The roof comprises various materials like corrugated alu-zinc 1500mm x 900mm x 0.55mm thick and asbestos roofing sheets of 1500mm x 900mm span.Facia board is a long timber of about 300mm x 12mm thick, the board is painted green overhang, with 100mm x 100mm thick column on a thwart wallas shown in plate 4:2.



Plate 4:3A View of Roofing sheets
Source: Author's fieldwork 2015

Asbestos roofing sheets of 1500mm x 900mm spanas shown in plate 4:3. Facia board is a long timber of about 300mm x 12mm thick, the board is painted green overhang, with 100mm x 100mm thick column on a thwart wall.



Plate4:4View Asbestos
Source: Author's fieldwork 2015

4.5.2 Ceiling board S.B.C. Gindiri, Mangu

The ceiling board is made of laminated light weight particle board which is use to beautify the interior and to reduce the rate at which the solar radiations penetrate into the buildingas shown in plate 4:4.



Plate 4:5 a view of the ceiling board
Source: Author's fieldwork 2015

4.5.3 Rafter of S.B.C. Gindiri, Mangu

The rafter in this building was not too visible but the roof carcase was done using hard woodas shown in plate 4:5.



Plate 4:6A View of the rafters
Source: Author's fieldwork 2015

4.5.4 Wall of S.B.C. Gindiri, Mangu

S.B.C. Gindiri most of the structure there were built in late 1950's by the then Sudan United Mission British branch (SUMB) as part of efforts aimed at ensuring that visually impaired children get educated,the building was made of mud walls,stonesandthe mortar which is use for binding of stones and mud blocksas shown in plate 4:6.



Plate 4:7 Administrative Block
Source: Author's fieldwork 2015

4.5.5 Doors and Windows of S.B.C. Gindiri, Mangu

The doors and windowinthis facility is 12 panel glazed casement that allow the passage of light and visual expression from the interior to the exterior. In some of the buildings they havelouvers window with framesas shown in plate 4:7. Long windows of 1200mm x 600mm, panel glazed window, the door double leaf door single swing with glazed panels, with high level windows the floor.



Plate 4:8A View of the door
Source: Author's fieldwork 2015

4.5.6 Floor Finishes of S.B.C. Gindiri, Mangu

Thepart of room that people walk on, is also flat horizontal part of a room on which people walk, items are kept on it. The floor generally is flat made of sandscreed as shown in plate 4:8.



Plate 4:9 a view of floor in the assembly hall
Source: Author's fieldwork 2015

4.5.7 Finishes of S.B.C. GindiriMangu

The finishes in the SBC Gindiri is rendered with mortar all over the schools and the internal part of the building is painted in water emulsion sky blue paint in the assembly hall, the exterior part of the building was painted white colour in some buildings as shown in plate 4:9.



Plate 4:10finishes on the walls
Source: Author's fieldwork 2015

4.6 Case study 2: Brief history of Gov't Vocational Training Centre,Zawan

The Government Vocational training centre Zawan Jos-South, Plateau State, is a school and vocational training centre for the blind, the school run classes sessions from primary one to junior secondary school three (JSS3), concurrently with vocational classes also taken to make some craft works for their livelihood as shown in plate 4:10 and plate 4:11.



Plate 4:11 Signboard of G.V.T.C. Zawan
Source: Author's fieldwork 2015

This is the site in which government vocational training centre is located as obtained goggle earth as shown in plate 4:11.



Plate 4:12 Google site map of G.V.T.C. Zawan
Source: Google earth map 2015

4.7 Spatial Organisation

The Government Vocational Training centre (GVTC) for the blind was designed toaccommodate visually impairedperson for schools and vocational training, the centre has two sections namely; primary and junior secondary school section 1 to 3 Junior secondary school and vocational section were the visually impaired student go to learn craft as shown

in plate 4:12.The classes and vocational halls are spreadwithout any pattern or hierarchyof operations, all the buildings are built by instinct.



Plate 4:13 G.V.T.C. Zawan Spatial Layout
Source: Google earth image map 2015

4.8 Building Circulation

The site is 5,900 m by 6,400 m horizontal and vertical longest distance and has very 12 buildings in use, with large space for parking and circulation due to unpaved area and all the building is sparse with a minimum of about 10m away from one building to another. So in general the site has wide unpaved roads within the facility with no kerbs in the facility the visually impaired move with the aid of mobility cane and some moving due to the number of years they had put within that environment with the facility as shown in plate 4:13.



Plate 4:14 Visual impaired student moving within the facility
Source: Author's fieldwork 2015

4.9 Architectural Character

Architectural character is the method, material and style in which the building is style designed and built. The structure in G.V.T.C. Zawan Jos-South, Plateau State, is with indigenous building material from foundation to finishes, roof was constructed with 1500mm x 900mm x 0.55mm alu-zinc, that rust with exposure to water, the roof carcass were made of woods of various sizes.

4.9.1 Roof of G.V.T.C. Zawan

The entire facility (centre) was roofed with alu-zinc roofing sheets, even though the material of the roofing didnot affect my area of study but is part of architectural character. The structure has 1500mm x 900mm x 0.55mm roofing sheets with gable end roofing method purely for old academic buildings as shown in plate 4:14.



Plate 4:15A View of classroom in G.V.T.C. Zawan
Source: Author's fieldwork 2015

4.9.2 The consideration of visual impairment G.V.T.C. Zawan

The basic consideration for visual impairments is the ramp that was located in the front of administrative block even though the ramp is steep for easy transition from the ground to the principal office, vice principal office and staff room where all meetings is donewith the school senior staff and principal officers of the schoolas shown inplate 4:15.



Plate 4:16A View of ramp in the administrative block
Source: Author's fieldwork 2015

4.9.3 Wall of G.V.T.C. Zawan

The sub-structure was made with boulders while the walls areindigenous building material even though it has little no or effect on the study as shown in plate 4:16.



Plate 4:17 a view of Walls finishes in G.V.T.C. Zawan
Source: Author's fieldwork 2015

4.9.4 Floor Finishes of G.V.T.C. Zawan

The G.V.T.C.Zawan was not designed with any tactile ground surface indicator (T.G.S.I.) or rail which will aid visual impaired person will be having same opportunity to movesby him/her without begin help, rather the facility was done to provide space for them to be useful to themselves and to the large societyas shown inplate 4:17.



Plate 4:18 a view of Floor finishes
Source: Author's fieldwork 2015

4.10 Case study 3: Brief introduction of national eye centre Kaduna (NEC) interview

The National eye centre Kaduna was commissioned on the 21st day of December 1992 by the then President commander in chief of the armed forces Federal Republic of Nigeria. The centre is a specialist hospital which deals with eye related issues. It is located off along Kaduna Abuja express way Kaduna, Kaduna State. The Centre comprises of different units and departments such as GOPD, accident and emergency unit, pharmacy, x-ray department, medical record, laboratory, theatre, eye clinic, paediatrics, administrative section, general store, generator house, and laundry/kitchen and inpatients wards.

4.10.1 Spatial Organization

The centre has various building depending on the functions of the space, the design approach was a not a single block approach, that is to say different units and sections of the hospital were detached from each other but connected with a series of walk ways only that some units were fused together in single block. The design did not follow Givoni's angle of

tilt as such buildings were exposed to direct solar radiation but horizontal shading device introduce at various point to coped the direct solar heating in the interior space of the building as shown in plate 4:18. In terms of the planning, hospital facility are planned like general outpatient department (GOPD) to treatment to ward but in these case the planning of the centre did not appropriately follow the basic planning of hospital centre due to complexity of the centre, starting from out patient's services to diagnostic areas and finally to inpatients areas, rather the hospital was haphazardly planned base on functional spaces, it started with the laboratory to outpatients areas then to in patients wards then finally the theatre which was pushed towards the back and far from the surgical wards as shown in plate 4:18.



Plate 4:19As Built Model for national Eye Centre Kaduna
Source: Author's fieldwork 2015

4.10.2 Building Circulation

Circulation in NEC is vital; circulation here denotes movement of people, patient, goods, services and vehicles from one place to another in the centre. The NEC has a clear distinction of vehicular and pedestrian circulation, but it did not state ease for

visuallyimpaired person movement within the facility. Although the centre has a defined and well landscape route for movement as shown in plate 4:19.



Plate4:20Paved Circulation Area
Source: Author's fieldwork 2015

4.10.3 Architectural Character

The centre's was to some extent adequately dealt with but the essence of this study addressing way-finding techniques for visually impaired person's was not considered how visually impaired person (blind person) can travel their way in and out of the facility, how they can access basic facility without being catered for has not being checked to addressed as shown in plate 4:20.



Plate4:21 Horizontality and verticality
Source: Author's fieldwork 2015

4.10.4 Wall of national Eye centre Kaduna

The NECis constructed with sand Crete block, painted with bright ash colour and the interior space with milky white colour. The wall has intermediary columns with large casement windows in-between two columns. The wall has a horizontal strip of handrail at 900m above the ground floor slab, black wood of 150mm depth 25mm thick which serves as aesthetic and hand rail panel use for guide in the interior space as shown in plate 4:21.



Plate4:22 900mm above ground level hand railing

Source: Author's fieldwork 2015

4.10.5 Doors and Windows of National Eye Centre, Kaduna

A movable barrier used to open and close the entrance to a building, room, closet, or vehicle, usually a solid panel, hinged to or sliding in a frame, doors at national eye-centre Kaduna double swing doors so as to carter for both entry and exit at both side to avoid accident and delay when an emergency patient is brought to the centre as shown in plate 4:22.



Plate4:23 Double swing doors
Source: Author's fieldwork 2015

An opening in a wall of a building, usually with an inner frame of wood or metal which the national eye-centre make use of casement windows all through, with glass fitted in it, to let in light and air as of when due. All the corridors in the centre have series of windows along the two side of the aisle as shown in plate 4:23.



Plate4:24 Array of windows
Source: Author's fieldwork 2015

4.10.6 Finishes of National Eye Centre, Kaduna

The floor was finished with different types of finishes ranging from rubber tile (linoleum), glazed tile terrazzo and carpet depending on the level of importance of the space in questions, like in the offices most of the floors are covered with carpets, while the corridors and space in which patient are received are tile of various nomenclature. There are different types of floor finisheswithin the centre i.e. namely; black and white rubber tiles (linoleum), of 150mm x 150mm place at checker position to give cool feelings of the spaces. Other types of tiles are the glazed tiled which is around the chief medical officer's office of 300mm x 300mm as shown in plate 4:24 and plate 4:25.



Plate4:25 Checker rubber tile lay along the corridor
Source: Author's fieldwork 2015



Plate4:26Stone coated glazed tile
Source: Author's fieldwork 2015

4.10.7 Services and facilities

These are auxiliary functions that are not constructions like but are equally important as thiskeepsthe building to perform optimally and adding value.In buildingsservices and felicities are namely: Water, Parking area, Electricity, and Means of vertical movement.

A. Water

Water supply source for the use of the entire centre was through a borehole. The centre was provided with overhead tanks which serve as the reservoir of the water from the

boreholePlate 4:26. The water from the borehole is pumped to the overhead tank which supplies water via natural gravity to various areas.



Plate4:27 Water supply tank
Source: Author's fieldwork 2015

B. Parking Area

The only parking spaces that were designed and constructed in the centre were; parking spaces for the senior medical workers and some key staff in the adminas shown in plate 4:27. The centre had few clear defined parking spaces for visitors, and also vehicles are parked at any space found convenient for parking, which at a point in time will create blockade.



Plate4:28 Parking space for senior medical workers
Source: Author's fieldwork 2015

C. Electricity

The electricity supply in the centre was a three-phase four wire grid system. However alternative means of power supply were also available in the centre to salvage the problem of power disappointment in the centre. Those alternatives were standby generators and solar panels.

D. Means of vertical movement

Although all the structures in the centre are two floors and single floors depend on the function of the space, some means for vertical movement were used where necessary, for example ramps and steps were used in the general outpatient department, entrance unit and eye clinic among others as shown in plate 4:28.



Plate4:29 Vertical movement To Administrative offices
Source: Author's fieldwork 2015

4.11 Building Materials and Structure

The materials used in the construction of the centre were concrete, sand Crete blocks, aluminium roofing sheet, aluminium and casement windows, flush and steel doors, wood for roof structure and partitions, ordinary ceiling board, asphalt, paint for finishes.

4.12 Landscape of the National Eye Centre (NEC) Kaduna

Landscape Architecture is the science and art of modifying land areas by organizing natural, cultivated, or constructed elements according to a comprehensive, aesthetic plan. The centre has defined landscape element such as hard and soft element which includes the buildings, kerbs, 600mm x 600mm slab tiles work-ways, concrete paved area while the soft landscape are element such as trees, shrubs, grasses, and flowers even though no unalterable rules exist in landscape architecture because each plot of ground offers unique

problems caused by variation in contour, climate, and surrounding areas but rhythm will be monitor to achieved good and aesthetically appeal siteas shown in plate 4:29.



Plate4:30Concrete paved area
Source: Author's fieldwork 2015

4.13 Conclusion of Case Study

Tactile ground surface indicator is lacking in every institutional buildings in Nigeria which SBC and GVTC is not an exceptions, according to Durdin& Hughes, and (2003) TGSI are textured surface features applied to walking surfaces, these provide blind and vision-impaired pedestrians with visual information and sensory information underfoot that aid them to walk and understand where, when and how to maneuver within a given facility without any form of accident and without being led by another visually abled person.

The school for the blind was initially built for visually impaired but the design never considered them. Haptic information a simple technology that can aid in there movement was never put in place, Fritz, Way,&Barner, (1996) define haptics refers to the sense of touch that aid transition. Blind considered haptic information as highly important, this is also missing.

The only considerations the two schools have was the ability of the teachers to teach the mastering two key things ability to have good perception of every facility they find themselves and conceptualized, at the perceptual level, the deficiency in the visual channel should be compensated with information perceived via other senses. Via sense of touch and sense of hearing become powerful information suppliers about recognised and, unrecognised surroundings.

The ability to travel autonomously relies on mastering Orientation and mobility, orientation and locomotion requires specialized training provided by Orientation and Mobility instructors. Orientation refers to the perception/knowledge of the spatial relations between the traveller and significant space features used as landmarks or directional clues (spatial updating); while mobility refers to the ability of moving safely, by the mastery of walking, detection, and avoidance of obstaclesGaunet,&Briffault (2005);Lahav, &Mioduser(2003); Golledge, &stimpson. (1997);Jansson, (1990).

Base on the study ofvisually impaired staff, studentsand visitors/patient of SBC, GVTC and NEC movement around the school and eye centre facilities with the aid of sense of conceptualized master plan of the school and eye centre the knowledge the acquired over the years.To avoid accident within any facility where visually impaired person will be visiting,certain majors have to be considered and be put in place.

Table 4.1 Conclusion of Case Study

S/N	PLACE VISITED	SPATIAL ORGANIZATION	BUILDING CIRCULATION	ARCHITECTURAL CHARACTER
1.0	SBC-GINDIRI	No pattern of arrangement was followed.	No defined circulation route was constructed.	Exhibition of indigenous building material was used.
2.0	GVTC-ZAWAN	No pattern of arrangement was followed.	No defined circulation route was constructed.	Exhibition of indigenous building material was used.
3.0	NEC-KADUNA	All roads are fully defined an well-constructed	All circulation routes are well defined and constructed. Most especially vehicle movement.	The centre display high used of horizontally and vertically in the design.
4.0	GENERALSUMMARY	The SBC and GVTC has poor spatial organization due building not plan and executed by professional while NEC did not consider visually impaired person into the design.	The SBC and GVTC have poor. The circulation was developed due movement pattern of staff and student over time while NEC has defined path.	The SBC and GVTC have somedesign traditional features while NEC have modern architectural touched on them.

5.0 FINDINGS AND DISCUSION

5.1 Introduction

Thischapter report the different cases found on the place were research was carried out, analyse and presented in tables, bar charts, pie charts. The research was done in line with the research questions and it was conducted in three-stage process. First, the data from the surveys was collected and entered into micro soft excel 2010, in order to obtained results and subsequently analyses. The questions were design in open ended format. Secondly, the data were summarized in a mode table and finally, the tabulated data were computed and produced in bar chart for easy illustrations.

5.2 Detail of the Analysis of the Questionnaire

The questionnaire has 2 sections; section A is bio-data and section B Way-finding and section B is further subdivided into 3 subsections; subsection I Categories of visual impairment, subsection II Consciousness of your environment among the visual impairment and subsection III Way-finding techniques approach use by visually impaired to walk round.

5.3 Section A of the Questionnaire Bio-Data

This section of the research questionnaire was designed to get the bio-data of the respondent gender, age range, marital status, and occupations.From the bio-data section of the questionnaire it will be observed that the majority of the visual impaired in Government Vocational Training centre for the Blind (G.V.T.C.) Zawan Jos- South, Plateau State, and School for the blind children (S.B.C.) Gindiri, Mangu Plateau State, from the two schools

where this questionnaire was administered several factors were put into consideration like the populations of male to female ratio male are more in number it may not be connected to female student not given due considerations to have western education, but risk of being rendered to evil.

The two schools G.V.T.C.Zawanand S.B.C. Gindiri,the school comprises of 61.91% males and 38.10% females and 65.71% and 34.29% respectively as illustrated by the figure 5.1of section A of the questionnaire (Bio-data of the respondent) which was designed to answer research questionas shown in Figure 5:1.

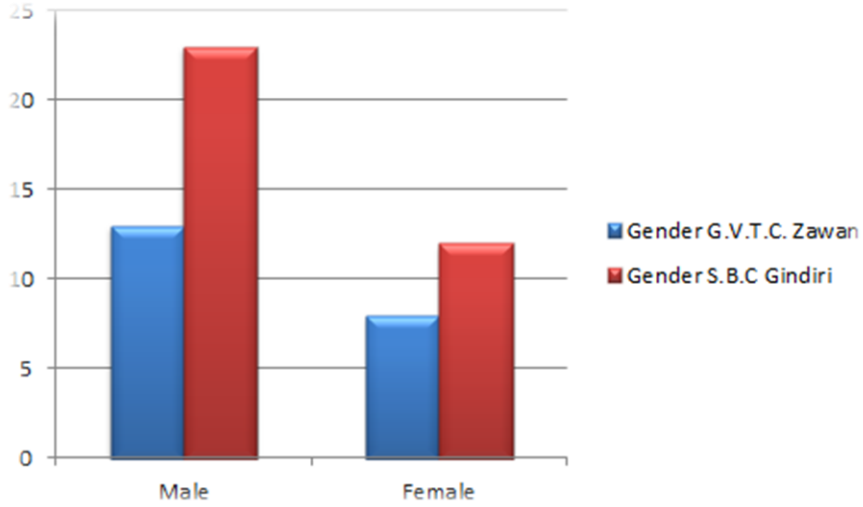


Figure 5:1 Gender Distribution of G.V.T.C. Zawan and S.C.B. Gindiri
Source:Author's fieldwork 2015

The Age distribution table 5:2 and figure 5:2 is done in the Bio-Data to capture the age and their perceptions about way-finding techniques for visual impairment whether age can serve as factors, in other to produce a template of architectural design that will be welcoming accepted and useable by visual impaired person. In the distribution table G.V.T.C Zawan, had age range of 15-24, 25-34, 35-44, and 45-54 years also with a

percentage share of 24.17%, 41.67%, 25.00% and 4.17% and S.B.C.Gindiri with same age range distribution had 56.77%, 37.84%, 2.70%, and 2.70% respectivelyas shown figure 5:2.

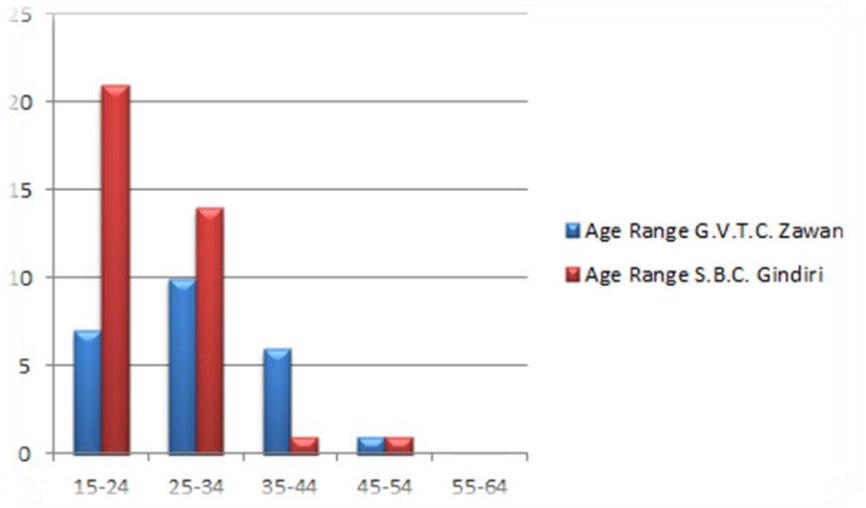


Figure 5:2 Age distributions of G.V.T.C. Zawan and S.B.C. Gindiri
Source: Author's fieldwork 2015

The marital status which show a distribution chart of married, single, divorced, widow and widower give various option to choose from on that note respondent were given enough options to choose from in GVTC Zawan had 9 married with comprises of 36.00%, 10 single 40.00%, 1 divorce 4.00%, 2 widow 8.00%, and 3 widower which comprise of 12.00% and in SBC Gindiri it has 7 married persons with 18.92%, 27 single which is 72.98%, 1 divorced 2.70% with no widow and 2 widower with a total per cent of 5.41% respectivelyas shown in figure 5:3.

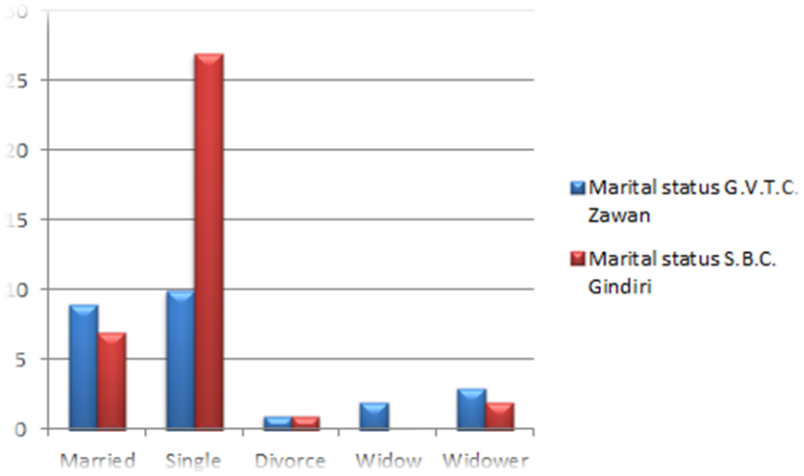


Figure 5:3 Marital Distributions of G.V.T.C. Zawan and S.B.C. Gindiri
Source:Author's fieldwork 2015

The last question on the Bio-Data section is the occupation in which the respondent is presently on it, Business /petty trade, civil servant or professional in any field, because the field in which the researcher administered this questionnaire is a school for the blind most of the respondent are students which dominant the entire scale in both schools visited by the researcher, i.e. in GVTC Zawan there are 21 students which comprises of 84.00% which they took the highest per cent follow by business/ petty trade with 12 persons with a per cent of 12.00% and 1 civil servant 4.00%, while on the other hand SBC Gindiri there are distributions across board even though the student population take the majority at the end with 21 students with 67.74%, 1 business/ petty trader occupying the fourth spot with a total per cent of 3.23%, 7 civil servant with 22.58% and finally 6.45% for professionalsas shown in figure 5:4.

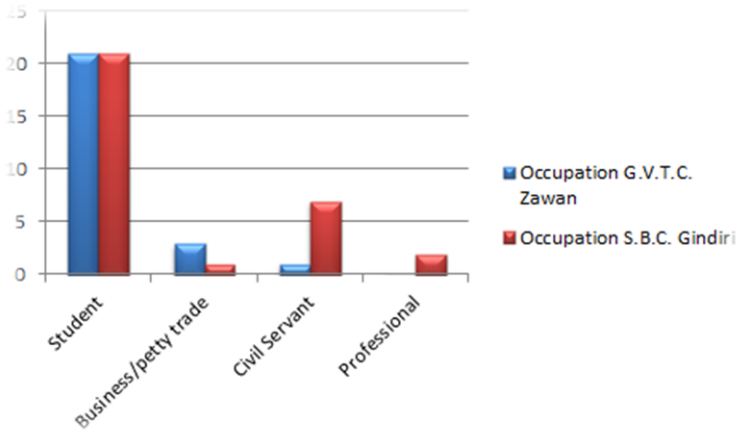


Figure 5:4 Occupational Distributions of G.V.T.C. Zawan and S.B.C. Gindiri
Source: Author's fieldwork 2015

5.3.1 Section B of the questionnaire (Way-Finding)

This section of the questionnaire dealt extensively on way-finding techniques and is further sub-divided into three basic sub heading i.e. categories of visual impairment, consciousness of your environment among the visual impairment, and finally way-finding techniques approach use by visual impaired to walk around.

5.3.2 Way-finding

This part of the questionnaire has two questions which ask the respond on the range in which they can perceive any object moving or stagnant, and the second is how you recognise person. These questions will give the research the inside on how to provide useful solutions to way-finding for visual impairment.

A. Categories of visual impairment from school visited

From the research question one, what are they different types of visual impairment? The type of impairment was classified with the range at which an individual can see from either

5m, 10m 15m or 20m, From the result obtained from the questionnaire distributed at S.B.C. Gindiriless than 44% of the visual impaired person can identify object at 5 metres interval while 25% of the students can Identify object at 10 metres, 14% can identify objects at 15 metres and 20% of the students can identify objects at 20 metresas shown in Figure 5:5.

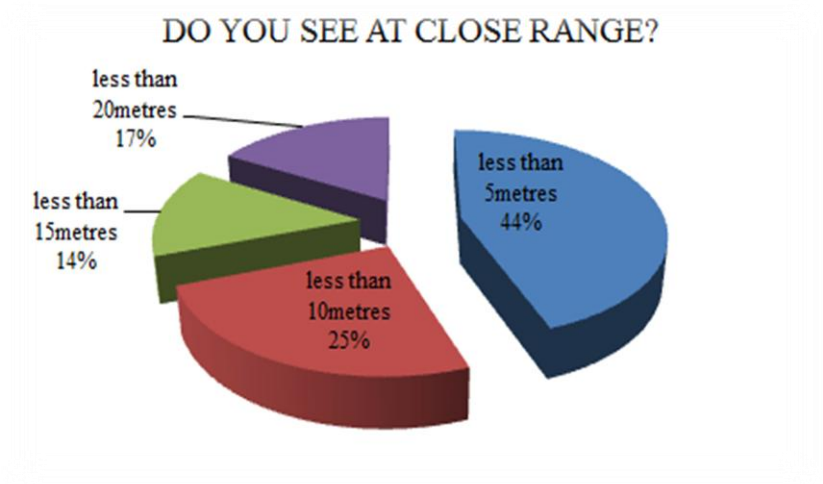


Figure 5:5 Way-finding (categories of visual impairment)
Source: Author's fieldwork 2015

In the GVTC Zawan where fourty questinnaire were also distributed the result obtained were 58% of the visual impaired can notice any objects in less than 5 metres without the aid of anybody, most especially in an environment that they are familiar with, while 21% of the students can notice within 10 metres, 13% can notice within 15% and 8% will notice within a radius of 20 metres without being help by another visually able person as shown infigure 5.6.

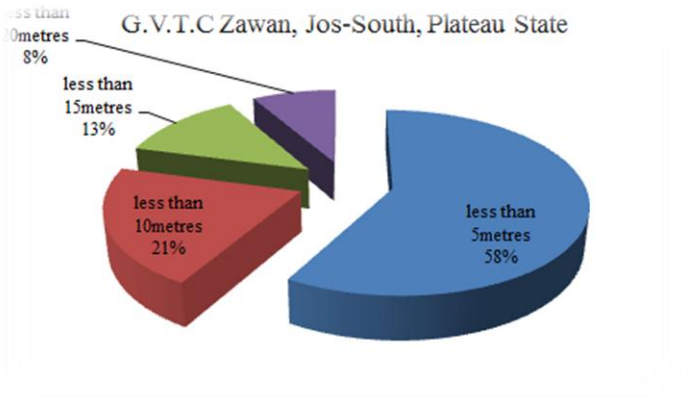


Figure 5:6 Way-finding (categories of visual impairment)
Source: Author's fieldwork 2015

From The question numbers two from the questionnaire;how do you recognised people? With the following options Colour, Smell, Sound, Footsteps,and result obtain from S.B.C. Gindiriwas shown by the pie-chart belowas shown in figure 5.7.

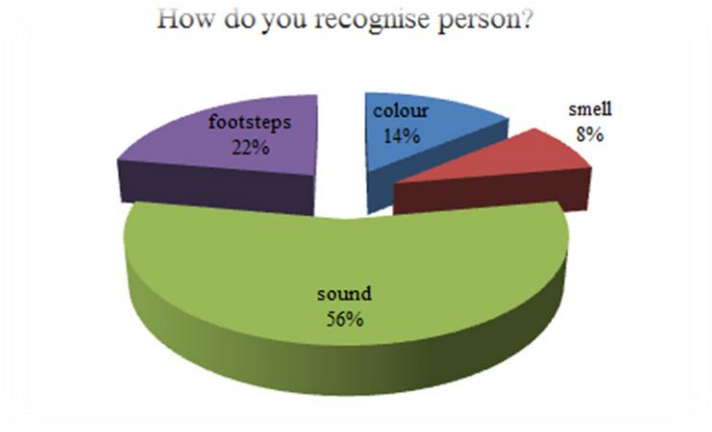


Figure 5:7 Way-finding (categories of visual impairment)
Source: Author's fieldwork 2015

In G.V.T.C.Zawanwhen confronted with a question 'how do you recognise person?' 50% of the students were of the opinion that they recognise people best on the sound and 25% of the same set of students said the recognise the persons based on their footsteps, 18% of them said the recognise based on smell of the individuals and just as 7% percent of them said the can recognise persons' based on colouras shown in figure 5.8.

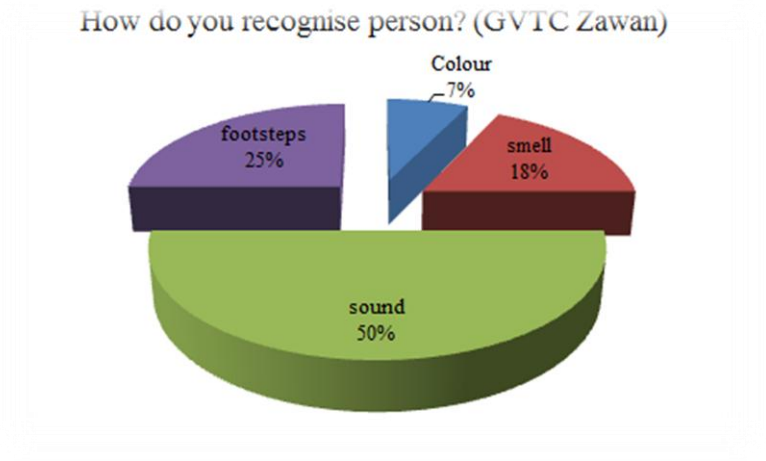


Figure 5:8 categories of visual impaired (G.V.T.C. Zawan)
Source: Author's fieldwork 2015

5.3.3 Section B II Consciousness of your environment among visual impairment

The consciousness of an individual's lays on ability to sense and to master environment as fast as possible, from theFigure 5:9below displayed that most of the visual impaired students and staff of S.B.C.Gindiri master there immediate surrounding by staying within the place for a time frame not as compare to G.V.T.C.Zawan, where the large per cent of the students consciously understand the environment by the help of visually abled person.58% of S.B.C.Gindiri consciously know their surrounding well when they stay for a given period of time, 20% of the students consciously know there environment by the help of visually abled person, even though this seems to be common when a place is to be describe to visual impaired person by a visual impaired person counting of doors or windows before entering into the space got 14% and bright paint on the wall helps visual impaired person locate his destination even though it got 8% of the opinion of the student in S.B.C. Gindirias shown in figure 5.9.

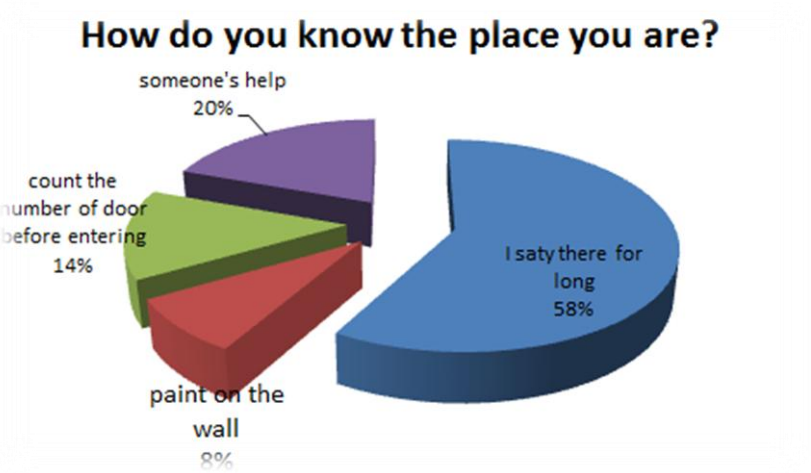


Figure 5:9 consciousness of your environment (way-finding)
Source: Author's fieldwork 2015

Government vocational training centre Zawan is a vocational school whereby most of the students were brought to acquire skills that will keep them going in the society with western educational from primary one to Junior Secondary School three (Jss 3)as shown in figures 5.10.

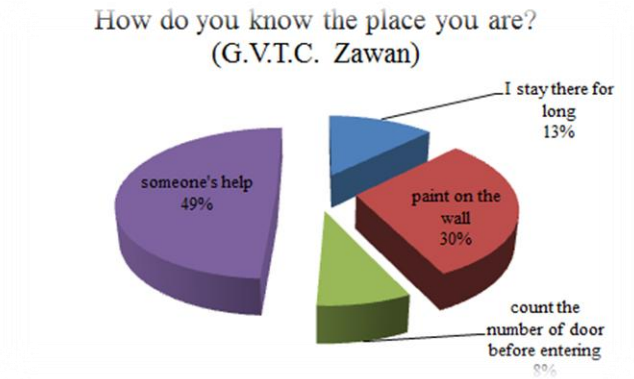


Figure 5:10 consciousness of your environment (G.V.T.C.Zawan)
Source: Author's fieldwork 2015

How do you consciouslyknow surrounding?Theresult of constant stay within a locality where an individual's growth or where he/she normally stay for most part of his/her life, nevertheless from the result obtained in the study conducted in S.B.C.Gindiri 41% of the visual impaired staff and student where of the opinion that normal place of abode is what

makes them gain much conscious of their surroundings, 28% say particular features they touch in a place makes them know the surrounding, and 17% people are of the opinion that someone must direct them before knowing there destination, and also 3% of the student say particular sound in an area helps someone to consciously know his surroundingsas shown in figure 5.11

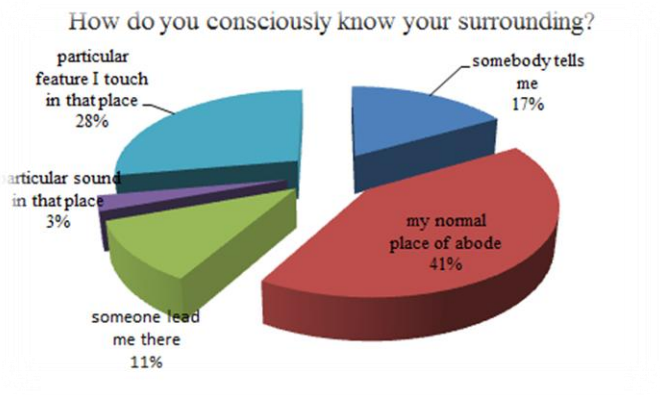


Figure 5:11 consciousness of your surrounding
Source: Author's fieldwork 2015

In GVTC Zawan, two of the sector are same which means the two options in the questionnaire havethe same number of responds and the options are; my normal place of abode with and particular feature I touch in that place all has 37%, three of the option have 2%, 3%, and 21%, somebody tells me, someone lead me there, and particular sound in that place respectively. This result shows that individuals vary what they tend to know and do due to place they grow fromas shown in figure 5:12.

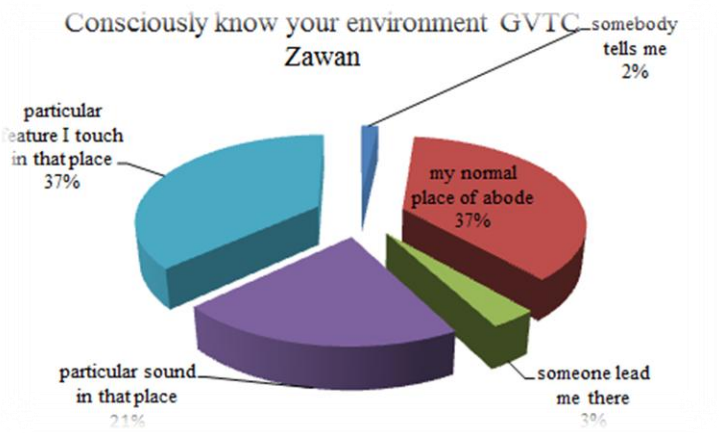


Figure 5:12 consciously knowing your surrounding
Source: Author's fieldwork 2015

The questions on 'how do you know the space you are in?'this chart answer the research questions to identify techniques employed by visually impaired person to find their way around, 31% of the visual impaired answer sense of touch, 30% answer they notice a particular feature in the place, 22% of the students answer the equipment in that space, while 14% of them say someone most lead them there, and 3% are of the opinion that they notice bright colours most oftenas shown in figure 5:13.

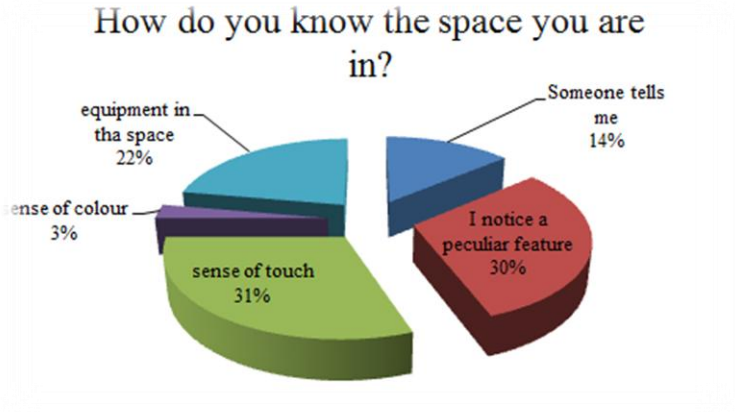


Figure 5:13 consciousness of your environment
Source: Author's fieldwork 2015

In GVTC Zawan 34% of the student say somebody will first of all lead them there keeping in mind that most of the students are there to acquire vocational training more prioity

isgiven to skill acquisitions than western education, so they tend to know skill works than western education, 30% of the student said they notice a particular feature in the place and 24% of them said they eqiupment in that space and 8%, 4% are of the opinion that colour and they other is sense of touch with the aid of a leading wallas shown in figure 5:14.

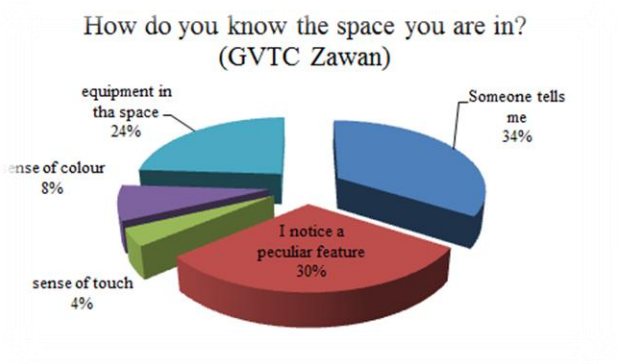


Figure 5:14 consciousness of your environment (G.V.T.C. Zawan)
Source:Author's fieldwork 2015

In trying to answer research question three 'What are the activities and the facilities the visual impaired person need to get around in a typical building complex?' this question was coined 'what are the techniques you employed to discover your immediate surrounding' 35% of the S.B.C.Gindiri students were of the opinion that common sense when an individual had master his/her environment they can use every facility in the space without any problems or obstructionsas shown in figure 5:15.

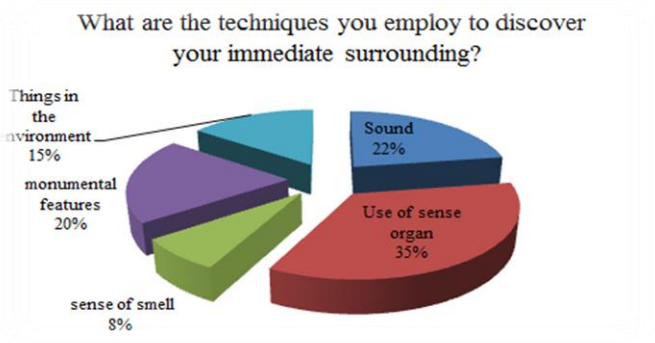


Figure 5:15Consciousness of the environment
Source: Author's fieldwork 2015

G.V.T.C.Zawan 42% of the visual impaired skilled acquired individuals say they understand their immediate surrounding by sound but multiple sound most especially the (new sound) that was not formally there affect them and make themmissed any destination of choice, as known truth when any human parts reduce it output level the others jack-up, so with the visual impaired their sense of smell is superb according to one of S.B.C. Gindiriold student, 27% of the students said sense of smell, 23% things in the environment 5% and 3% use of sense organ and monumental features respectivelyas shown in figure 5:16.

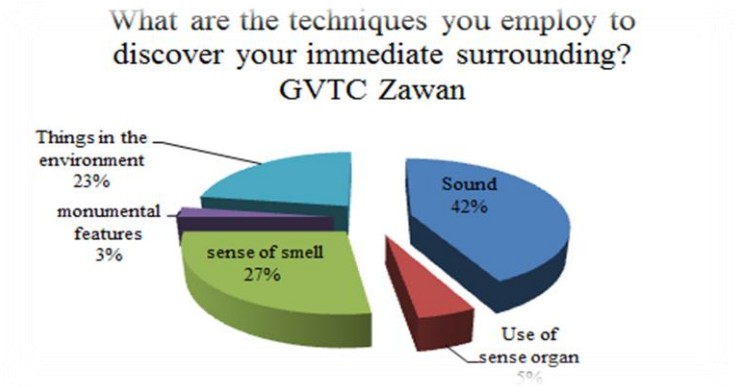


Figure 5:16 consciousness of the environment (G.V.T.C. Zawan)
Source: Author's fieldwork 2015

A total of 36 visual impaired staff and students of S.B.C.Gindiri filled the questionnaire and returned to the researcher whereby the questions try to answer research questions three 'What are the activities and the facilities the visual impaired person need to get around in a typical building complex?' 64% of the student understand their immediate surrounding very well means there will possibly little or no stumbling within the school few case of accident as a result of walkways and kerbs, 25% of the student have good knowledge of their surroundings, 8% are not sure which the categories they belong, 3% this possibly are

new students or due to proper landscaped environment in which will help in their movementas shown in figure 5:17.

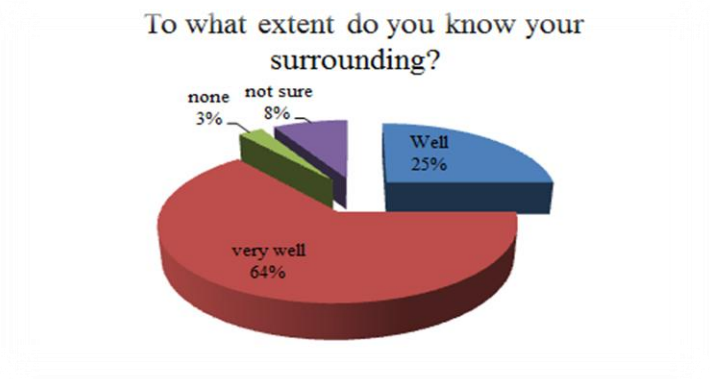


Figure 5:17 consciousness of your environment
Source: Author's fieldwork 2015

In G.V.T.C.Zawan 40%, the visual impaired person in the vocational centre have a good knowledge of their immediate surrounding 37% of the visual impaired persons have do nothave enough knowledge of the centre whereby they can move without the aid of another visually abled person 13% can move but will desire to have an aid at any particular period of time when they miss their way, and the remaining 10% of the visual impaired person know the environment due to long stay in thefacility and are able to direct, give good descriptions of the place without any possible accident to any new studentas shown in figure 5:18.

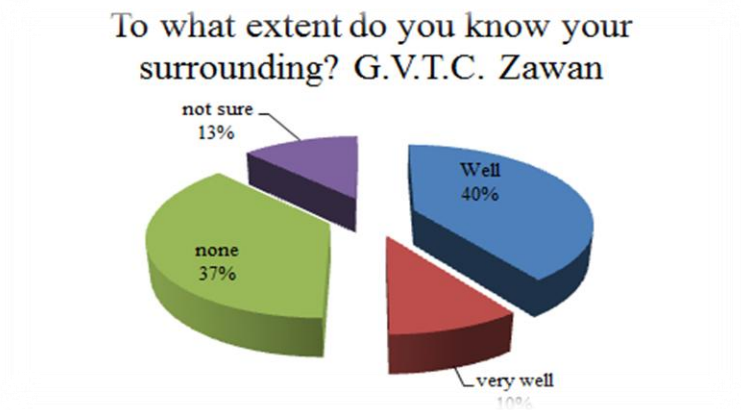


Figure 5:18Extend of understanding (G.V.T.C. Zawan)
Source: Author's fieldwork 2015

In SBC Gindiri, 39% of the students use mobility cane to move before mastering the environment and dropping it, 28% of them said sound of different objects or air within a space help them to know any diversions of roads, while 22% of the students said someone will lead them there first and subsequently you will move to the same place without any hitches and 11% of the students said somebody most tell them first then it sticks to their memory and movement become much easier and freely without any accidentas shown in figure 5:19.

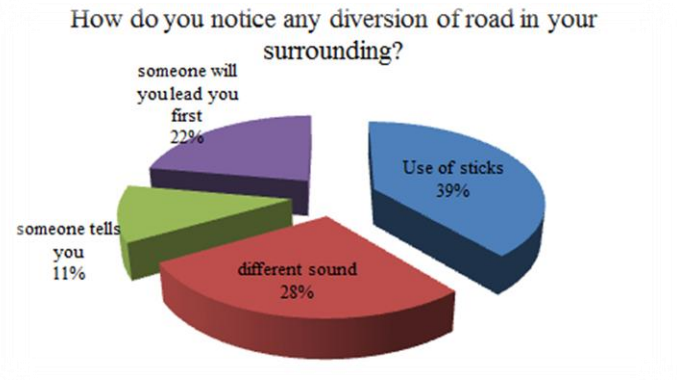


Figure 5:19 use of mobility cane
Source: Author's fieldwork 2015

On the other hand, GVTC Zawan use of mobility cane is common among visual impaired person 37% of the students in the vocations centre also concurred with what the student in

SBC Gindiri said, that moving with mobility cane helps them to move and notice any diversions of road more easier, 35% of the student said somebody will lead them there first, 23% somebody will tell them first and sound they said helps only when an individual is familiar with the place before it helps to notice any diversion of roads in a localityas shown in figure 5:20.

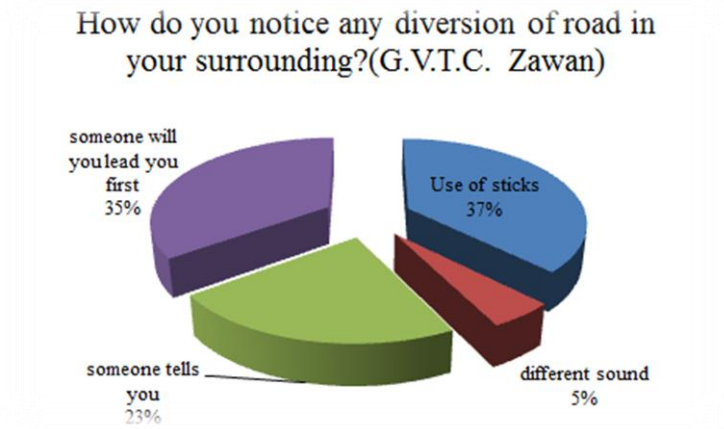


Figure 5:20 use of mobility cane (G.V.T.C. Zawan)
Source: Author's fieldwork 2015

5.3.4 Section B III Way-Finding techniques approach use by visually impaired to walk around

This section will answer research questions two and three 'What are the techniques employed by visual impaired person to find their way around in accessing public space? What are the activities and the facilities the visual impaired person need to get around in a typical building complex?

At S.B.C.Gindiri, one of the questions that was ask in the questionnaire on 'what are the techniques, you employ to manoeuvre your ways?' series of options were given like use of monumental features, sound in the place you are going, use of sticks (mobility cane), and

also help by someone these are per cent obtained to each respectively 14%, 17%, 33% and 36% as shown in figure 5:21.

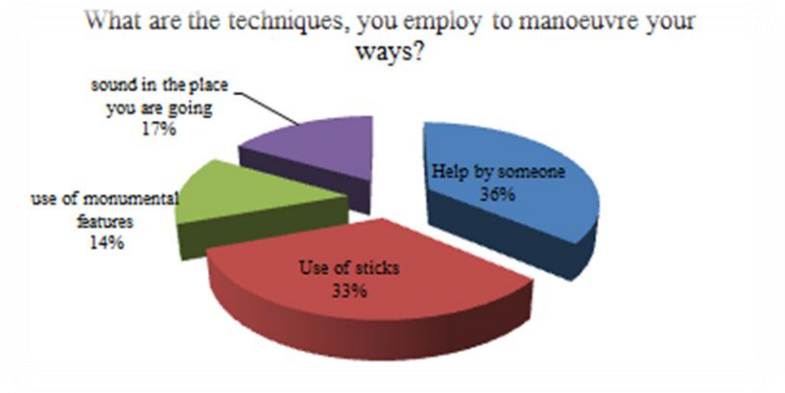


Figure 5:21 manoeuvre your ways
Source: Author's fieldwork 2015

On the other hand GVTC Zawanstudent'sopinions are that use of sticks is mostly safe and allows them to have free movement.After the compilations of the data very few of them take sound into cognisance and some complained that multiple sounds can either direct them well or possibly makes them to miss their way. The result from G.V.T.C.Zawanwere, sound in the place they are going 10%, use of monumental features 16%, help by someone 32% and use of sticks (mobility cane) 42%as shown in figure 5:21.

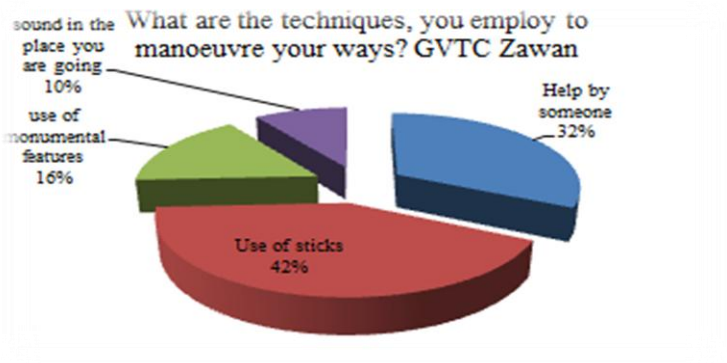


Figure 5:22 manoeuvre your ways GVTC Zawan
Source: Author's fieldwork 2015

The visually impaired person's try to keep most of their belongings in an organise manner so as to avoid collision with objects in their room, therefore their environmentis adequately arrange to avoid any casualty, the result obtained from the study posit only 3% said handrail, handrail is better but due to unavailability of it in their area, 16% was accredited to help by visually able person or someone that is familiar with the place, 25% of the visually impaired person follow a straight path, 28% are of the opinion that they make use of what is in the environment to move and also 28% of the visual impaired person hold mobility cane to move at first instanceas shown in figure 5:22.

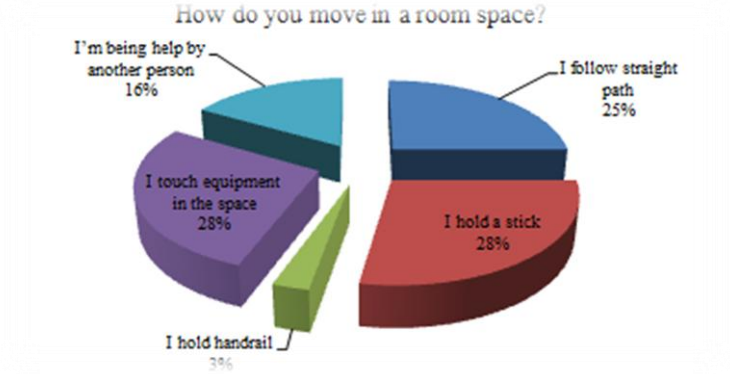


Figure 5:23 manoeuvre in room space
Source: Author's fieldwork 2015

In GVTC Zawan most of the students are adult so understanding of spaces takes them a long while when compared to the younger one's from the statistics shows that virtually the number of persons that will be lead is on the high side or must of them are inexperiencedof the new environment, and it takes the timecompared to younger once,13% said the follow straight path, 18% said the being help by another person, 18% said the hold a stick (mobility cane), 23% said theyhold handrail and 28% said they touch equipment (type writer; desk; chair; and embossed machine) in the spaceas shown in figure 5:24.

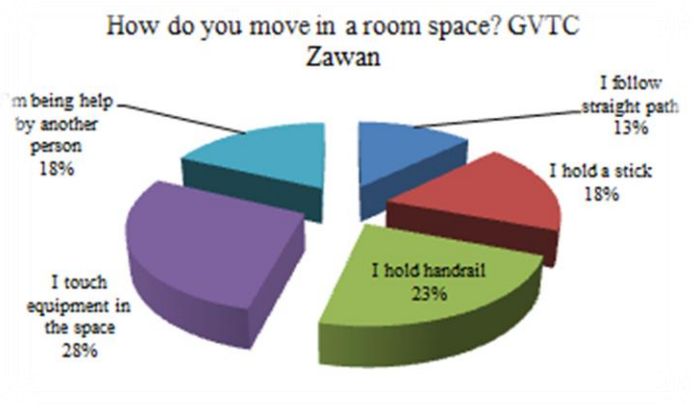


Figure 5:24 manoeuvre in room space GVTC Zawan
Source: Author's fieldwork 2015

This questions 'what are the techniques you use to search certain things in your rooms or office?(stylus; braille sheet; and braille machine)' is answering research questions 2 'what are the techniques employed by visual impaired person to find their way around in accessing public space?' and after the collations and compilations of the result the student of S.B.C.Gindiri5% of them use a leading wall, 8% of them use mobility cane, 24% of them use another individual for a month and half to help them move, 30% of them master their environment within a limited time frame, and 33% of them say they use common sense to search things most especially they are the ones that keep themas shown in figure 5:25.

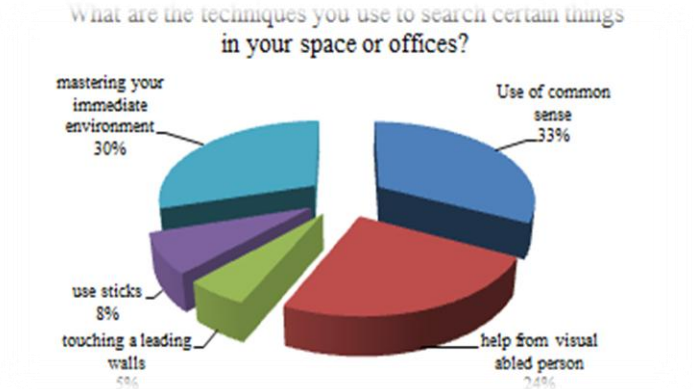


Figure 5:25 searching of things
Source: Author's fieldwork 2015

On the other hand GVTC Zawan student's collation of result shows the use of common sense and mastering once immediate environment 28% of the total scores, help from visual abled person 26%, use of mobility cane 13% and touching a leading wall 5%as shown in figure 5:26.

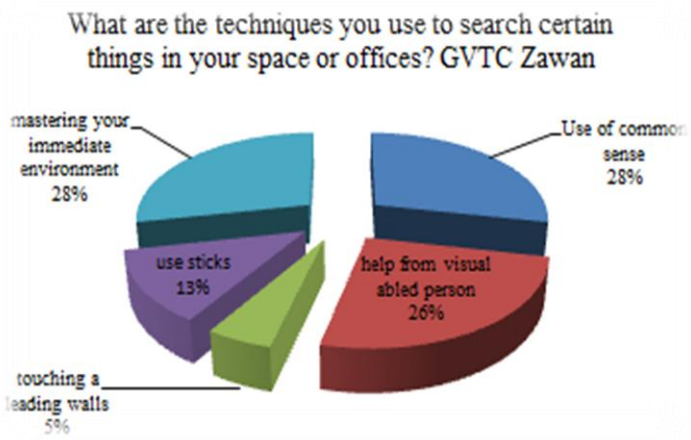


Figure 5:26 searching of things
Source: Author's fieldwork 2015

This question helps in answering research question 3 'What are the activities and the facilities the visual impaired person need to get around in a built-up complex?' Do they frequently miss their way? How often? As a result of, whydoes this happened?So provide succour for feature occurrences. The result as obtained from S.B.C.Gindiri is as follows: 8% always miss their directions, 13% are sure of missing, 29% are none sure of missing and finally 50% not sure they miss direction within the facility they find themselfas shown in figure 5:26.

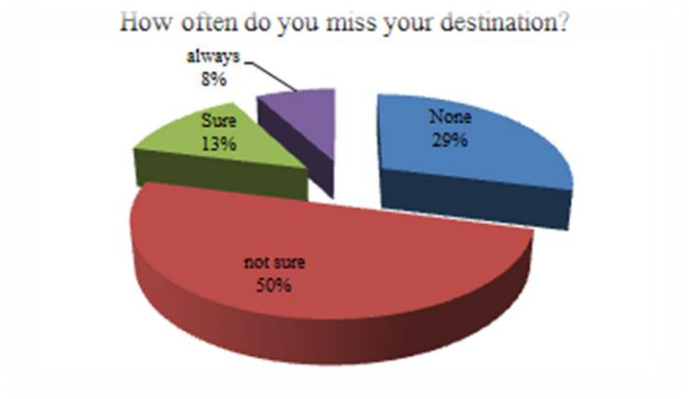


Figure 5:27 missing destinations
Source: Author's fieldwork 2015

On the other hand G.V.T.C.Zawan the case was more of a similar case whereby 33% percentage are either sure or not, the result obtained are as follows none has 6%, always miss destination is the second categories with 27%, followed by sure with 33% and finally not sure of missing my way within the school premises has 34%as shown in figure 5:28.



Figure 5:28 missing destinations
Source: Author's fieldwork2015

This question is to tackle research question 3 'What are the activities and the facilities the visual impaired person needed to get around in a built-up complex?' How long will it take you to notice change in level in either your house or office? According to survey carried out in SBC Gindiri the result obtained was 14%, 17%, 26% and 43% someone tell me,

sound produce through the path, I use mobility cane and finally sense of touch that will lead me there respectivelyas shown in figure 5:29.

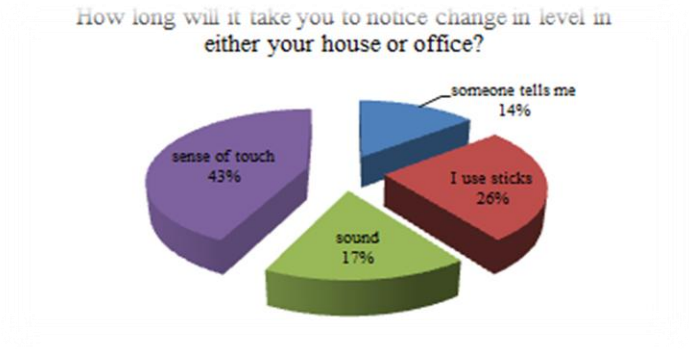


Figure 5:29 change in level
Source: Author's fieldwork 2015

The question is to tackle research question 3 'how long will it take you to notice change in level in either your house or office' was ask in G.V.T.C.Zawan the result shows the use of mobility cane is more common in use than use of sound whereby in S.B.C.Gindiri 17% of the students choose sound while in G.V.T.C Zawan 4% choose for such, the result as obtained from the study is as follows: sound 4%, sense of touch 13%, someone tells me 39% and finally I use mobility cane to the place 44%as shown in figure 5:30.

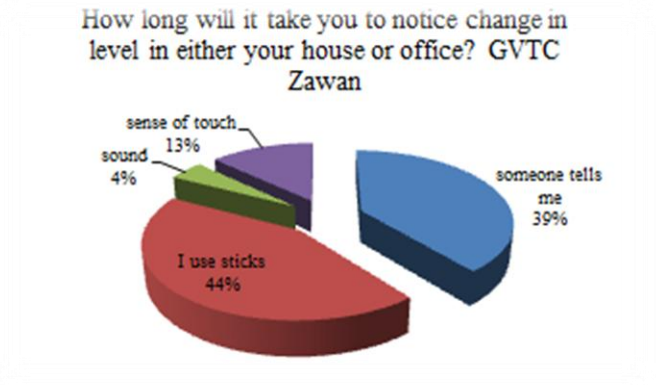


Figure 5:30 change in level GVTC Zawan
Source: Author's fieldwork 2015

This question 'How do you to notice change in level' in the questionnaire was design to answer research question 2 which state 'What are the techniques employed by visual

impaired person to find their way around in accessing public space?' in addressing the issue the SBC Gindiri responds to the question was obtained and show as follows handrail 14%, someone's help 14%, use of mobility cane 28%, and finally I have mastered my immediate environment 44%as shown in figure 5:31

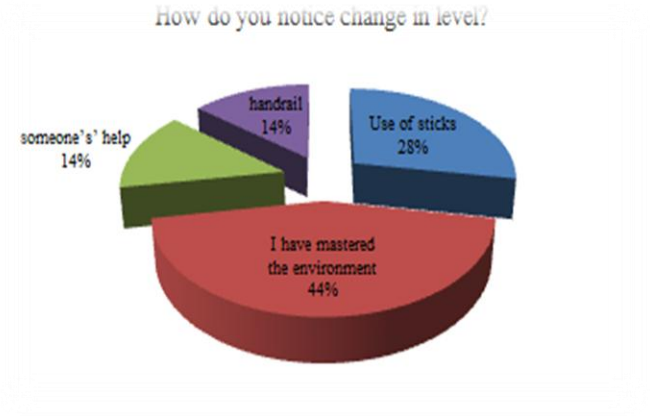


Figure 5:31 notice change
Source: Author's fieldwork 2015

This question is design to answer research question 2 which state 'What are the techniques employed by visual impaired person to find their way around in accessing public space?' the space to access and also differentiate them base on functions or use, the following are their respond towards the questions colour of the space has 6%, mastering and step counting has 14%, someone tell me first has 34% and finally sense of smell has 46%as shown in figure 5:32.

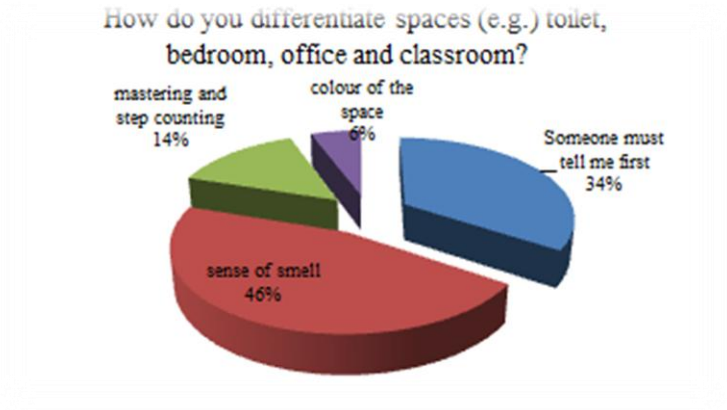


Figure 5:32 differentiate spaces
Source: Author's fieldwork 2015

However on the other hand GVTC Zawan opt for colour of the space for 37%, someone must tell me first has 30%, sense of smell has 24% and finally mastering and step counting has 9%, although in this school there are student who are partial sighted so mastering and step counting will be difficultas shown in figure 5:33.

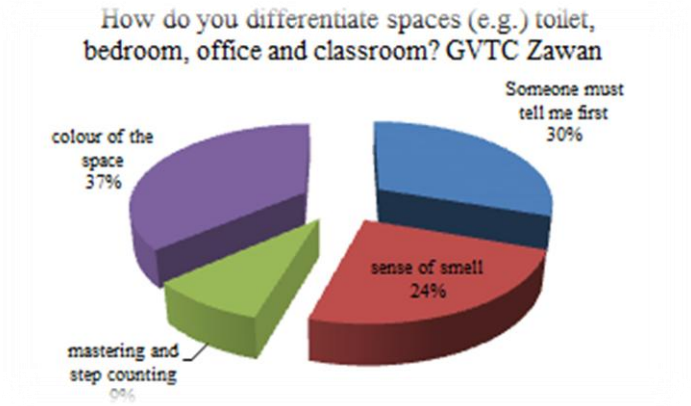


Figure 5:33 differentiate spaces GVTC Zawan
Source: Author's fieldwork 2015

Do you understand any place at first visit? Was the question that was asked to both S.B.C Gindiri and G.V.T.C.Zawan so as to understand the level at which they comprehend built in environment, this questions is designed to answer research question 4 which state that 'How can design address issues of way-finding among visual impaired be made? The result

obtained were 6% very sure, 8% sure, 25% not sure and 61% they don't understand the new environment at first visitas shown in figure 5:34

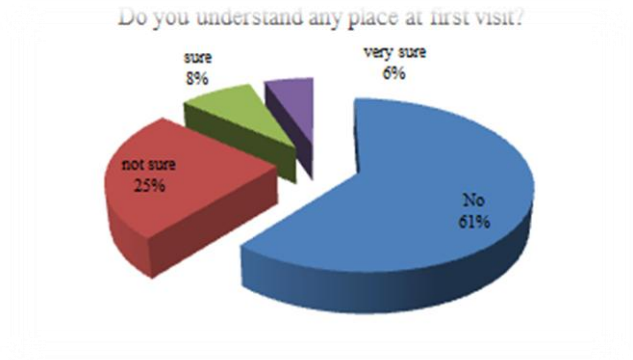


Figure 5:34 understanding places
Source: Author's fieldwork 2015

At first visit the G.V.T.C.Zawanare of the opinion that missing once way is basically an issue for new students. The result obtained this result not sure had 37%, 27% not, 27% very sure and 9% sure they don't understand any place at first visitas shown in figure 5:35

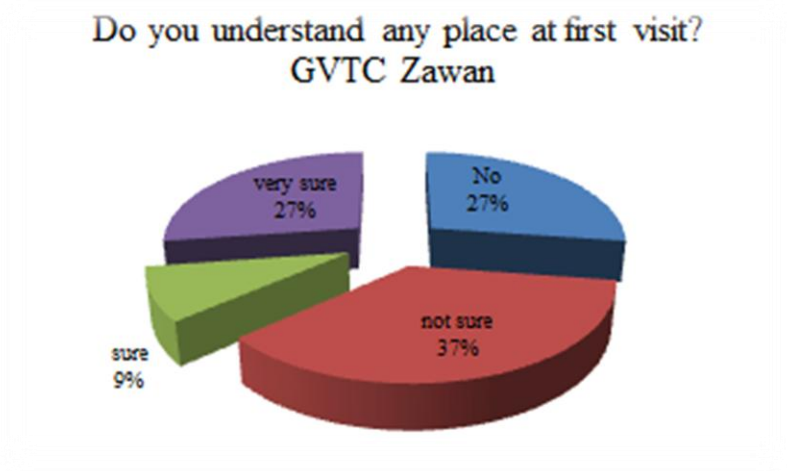


Figure 5:35 understanding places GVTC Zawan
Source: Author's fieldwork

5.4 Discussion and General Summary

The study posits several findings such as the questionnaire which serve asa tool for data collection.The following research questions were answer by the questionnaire; question 1). What are the different types of visual impairments? 2). what are the techniques employed by visual impaired person to find their way around in accessing public space? 3). what are the activities and the facilities the visual impaired person need to get around in a typical building complex? 4). How can design address issues of way-finding among visual impaired be produced?

Research question one what are the different types of visual impairments?

Table 5.1 Visual Acuity

Categories of visual impairment	Ranges of visual	remarks
Blindness	3/60	Medically blind
Severe Visual Impairment (SVI)	6/60 to 3/60	Partial blind
Moderate Visual Impairment (Mod VI)	6/18 to 6/60	Partial sighted
Mild Visual Impairment (Mild VI)	6/12 to 6/18	Little problem
Normal (N)	6/12	Good sight

Research question two what are the techniques employed by visual impaired person to find their way around in accessing public space? Fig. 5.9 answer and give descript as 58% of them say they understand any place based on the number of years they stay there, 20% say most be assisted first and subsequently start to move without any aid, 14% count steps and 8% get to destination due to colours. Fig. 5.10 someone help 49% paint on the wall 30%, is also believe that staying in a place for long time 13%, and step counting 8%. Fig. 5.11 question ‘how do you consciously know your surrounding? 41% of visually impaired

opined for them to consciously know your surroundings, they have to stay there for a while, 28% believe they should be familiar with some feature in they place they are going, and 11% will require assistance from visually impaired.

Research questions three ‘what are the activities and the facilities the visually impaired person need to get around in a typical building complex? Fig. 5.22 answer the research question three, the question what are the techniques require to manoeuvre once way?42% uses mobility cane, 16% believe monumental feature within the space, 32% need some degree of help from others, and new sound caused 10% of them missed directions, fig 5.23 also answer research question three, 28% make use of mobility cane, 25% follow straight path, 16% need help by visually abled person and 3% said rails will ease their movement. Fig. 5.24answer research question three, 28% touch a leading wall, 18% hold mobility cane.

5.5 Conclusion

The research is meant to serve guide in the design of an eye centre for visually impaired. The was done largely to accommodate visually impaired person, considerations was also given to old aged people due to promptness to eye related problem associate with aging. Provision of handrails was proposed to mitigate the effect of accident among the visually challenge staff, patient and students. The proposed design provided plants of various smell at different point which served as landmark that will make them move with no hitches.

6.0 DESIGN REPORT

6.1 Introduction

This chapter will narrate what the design have to cover, how the design cover it, why the design need to cover what is to coveredall as a result of research findings.Design frame work, Design brief, General requirement, Brief development, Studied area, Site selection for hospital, Site criteria, Eye-centre site selection criteria, Propose Site location, Analysis of the proposed site, Architectural design of the proposed General Hospital.

6.2 Principle Adopted to the Design

1. Create an identity at each location, different from all others i.e. smelling plants.
2. Use landmarks to provide orientations cues and memorable locations.
3. Create well- structured paths with handrail (haptic information) and tactile indicator
4. Create regions of differing non-visual character sound i.e. waterfall.
5. Use survey views (give navigators a vista or map).
6. Provide signs at decision points to help way-finding decisions.
7. Use sight lines to show what's ahead.
8. Braille wall in the interior part of space.

6.3 Design Frame Work

Various research where carried out by individuals on schematic design frame work in this pattern admission diagnosis /treatment the patient goes to either inpatient or outpatient and finally dispatched Carr, (2011) the design and planning of eye centre Carr

wasadoptedoutpatient related functions, Diagnostic and treatment related functions, Administrative functions, teaching and research related functions, Inpatients related functions and finally services related functionsas shown in figure 6:1.

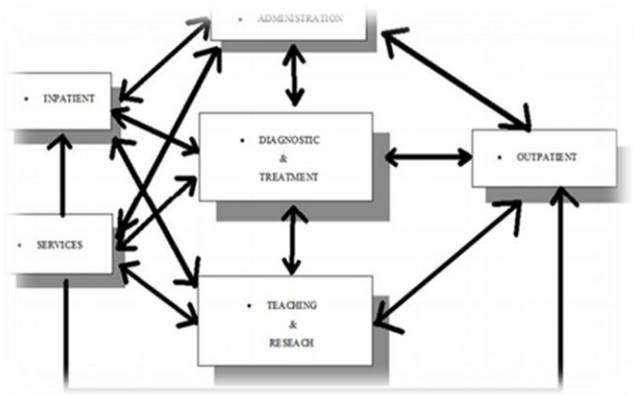


Figure 6:1 Conventional designs and planning of hospital
Source: Carr 2011

6.4 Design Brief

The Nigeria national blindness and visual impairment survey,(2005-2007) states that the north-east is second to north-west populations of visual impaired person with a population of 221,993 which Taraba out of six state of Adamawa, Bauchi, Borno, Gombe, and Yobe, has more than half of the figure from the region, the number of visually impaired person was due to river blindness in Garbabi, Gashaka local Government area the need for the facility that will cater for people with visual problem like eye-centre for visual impaired will be in place. The researcher dims it fit to provide a space which will accommodate person with partial and legitimatelyblind person in other to again sight or to move on with the disability and get acquainted to average life.

6.4.1 General requirement for the design of eye centre

Introductions, design philosophy, site inventory, contour, concept generation, planning and sketches design plans, elevations, sections, and services. Complete set of drawings include working drawings, details drawings and 3-dimensions drawing.

B. The brief: following aspects were considered.

Locations:

1. Within the city limits or just on the periphery.
2. Proximity of catchment area for enhanced clientele.
3. Ease of accessibility by cars particularly by internal road network.
1. Good entertainment and business profile of the surrounding zone.
2. Should address security services.
3. Proximity to emergency services.
4. Ease of waste disposal, noise reductions and control.

Site:

1. General level ground if available.
2. Locations/area.
3. Large parking area.
4. Open spaces for garden layouts and recreations area.
5. Security zoning and barriers

Planning:

1. Climatic influence including energy efficiency.

2. Use of material and modern technology.
3. Building regulations.
4. Available of services i.e. communication, light, and water.
5. Impact on the eco-system and environment.

Design:

1. Concept to be simple with functional character.
2. Space optimizations and efficiency for ease of movement.
3. Vehicular and pedestrian circulations should be efficient, within and outside the eye-centre.
4. Proper natural lighting and ventilations should be giving adequate concern.
5. Fire prevention and security conscious design using modern technology.
6. Landscape design and visual impact.

Services:

1. Provision for adequate water supply and storage.
2. Power generations and priority based on national grid (P.H.C.N).
3. Waste collection and safe integrated disposal system.
4. Provision of communications and visual corridors.
5. Maintenance and fire hydrant at strategically points.
6. Emergency treatment, evacuations and crowd control.

6.4.2 Brief development (interview)

After series of consultation, interview, with related authorities in the likes of a teacher in, S.B.C. Gindiri and the principal of G.V.T.C. Zawan a holder ofB.Sc. in special education in visual impairment and books, journal articles and medical practitioners, chief nursing officer optometry in university health service A.B.U Zaria; they all give their views on how visual impaired environment should be without any difficulties to them and also on the other hand gave how ophthalmic processes is being carried out, after the whole consultation a brief was develop thereby forming schedule of requirement based on chief nursing officer optometry guide and schedule of accommodation and finally space analysis. Figure 6:2 below shows the detailed illustration of the concept as shown in figure 6:2.

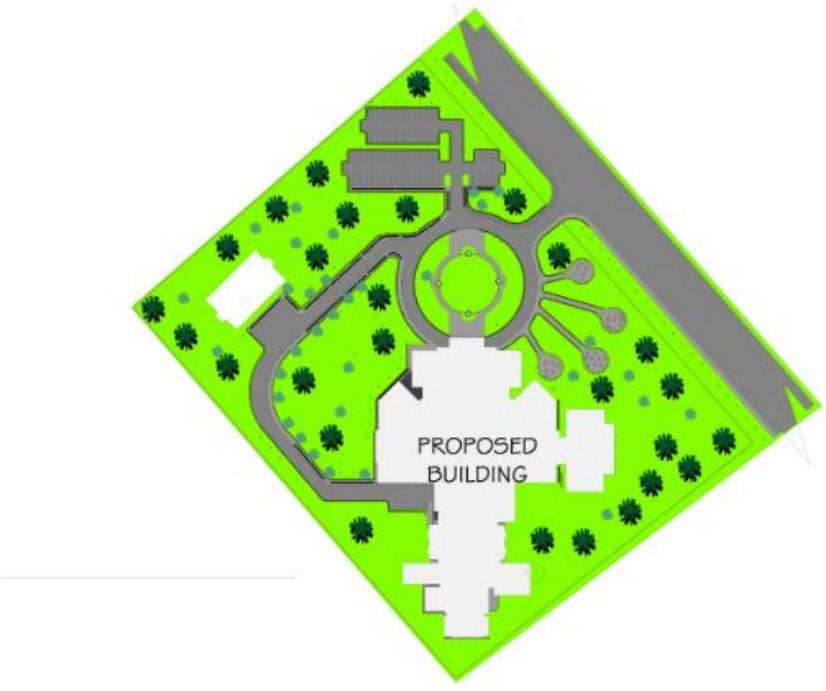


Figure 6:2 Site development concepts
Source: Author's fieldwork 2015

6.5 Studied Area

The study area is Jalingo town, the capital of Jalingo Local Government area of Taraba state. Jalingo is located within latitude 8°88'33''N (degrees, minutes and seconds) and longitude 11°36'67''E (degrees, minutes and seconds) in the Northern part of Taraba, covering an area of approximately 422km² and according to 2006 census, Jalingo Local government has a population of about 175,735 with a growth rate of 2.4% annually (Andrew &Szeto 2006),http://thegpscoordinates.net/nigeria/jalingo (2015). The Local Government shares common boundaries with Zing to the east, KarimLamido to the west, Yorro to the north and Ardo-Kola south. It is located within the transitional savannah region of Northern Nigeria with two distinct climates as recorded in the Northern Nigeria – Rainy season and dry season Saskatoon, (2010). Rainfall starts from the month of March end and ends in early October. During this time temperature range between 30°c – 39°c in the afternoon and comes down to 25°c – 26°c in the night. The dry season begins in the month of November when the northeast winds bring harmattan dust and the temperature falls to about 20°c - 24^{o} c during the day. The weather is generally favourable all year round as shown in figure 6:3.

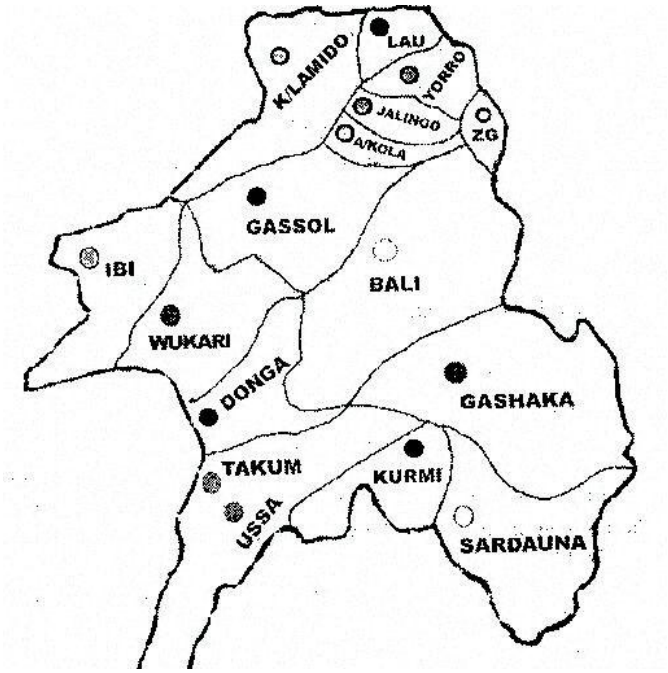


Figure 6:3 Map of Taraba
Source: www.google.com/nig/map.jtaraba 2016

Vegetation is typically that of the transitional Savannah, characterized by scattered trees and shrubs. However, the original vegetation has been greatly altered by human activities such as clearance for cultivation and firewood.

6.5.1 Site Selection Criteria for Hospital

As adopted in Soltani&Marandi (2011) the need for quick access by car and emergency service, proximity to arterials is being considered as one of the most important criteria in hospital site selection. Furthermore, having appropriate access is a key criterion taken into account by patients to choose a hospital to go.

Service area of a hospital represents its potential demand. Distribution of hospitals throughout the study area is another important point needed to be considered. A balanced

distribution of service centres provides community with a higher level of social equity. Being more away from other medical centres can be a positive factor for an alternative site.

A. Site criteria for hospital design

Accessibility: The ability of an individual to appreciate or understand without specialist knowledge. Entry or approach to a place without difficulty. Easily reached easy to enter or reached physically.

Land use act: What's the law of the land saying patterning the development that is going to be in place?

Circulations: Flow of streets houses and free movement of persons without being interrupted by close, barricade or several other things. They should be adequate space of parking, shops, houses, and open spaces for relaxations and so on.

Natural resources: The nature's endowment should be properly exploited so that all materials that will be used for the constructions should be if possible generated from within Jalingo and its environs.

Planning regulations: What's the Government policy on the use of land at that particular time and place of the development?

Site suitability: The site chosen was the best for the design of eye centre for visual impaired, because it's located at the outskirt of the main city.

Client brief: What's the financier of the project what, needs, at that particular time of commission and how much has he budgeted for the projects. And the time of constructions he wants, type of material he want for the project. And the time bound he want the project to be completed.

Environmental impact: The building is as a matter of urgency reduces the quality of fresh air in the micro climate but provision of trees to improve the micro climate of the facility.Kroll (2004);Lynch, (1960);Marston, (2002);Mollerup. (2009); Molly, &Stephen, (n.d.); and Read, (n.d)

B. Eye-centre site selection criteria

Generally, a medical facility i.e. hospital sanatorium, sickbay, and infirmary sites selection is based on two constraints: internal resource allocation and external resources the cost of Soltani&Marandi,(2011)., Saskatoon Health Region,(2010).

Planners and policy-makers normally do a trade-off between these two to take the final decisionHaron, & Hamid, (2011). An appropriate located medical facility needs not only to be regionally compatible and complimentary but also keeps almost internal advantages of the site. Therefore, the distinctive characteristics of the site such as accessibility, centrality, ownership, and size should be paid enough attention (Estill& Associates, 2006).

Depending on the size and scale of the facility (eye-centre), a broad range of site selection criteria has been recommended Soltani&Marandi, (2011). These criteria have been establishedto compare the relative viability of each site to house the proposed facility (Zhou, 2012).

The site which this research study primarilyprosed for a health facility, so whatsoever might be the case the site will be work upon to suit the criteria.

C. Propose Site location

The proposed site for the proposed eye-centre for visual impaired is situated in Jalingotown. The site is covered with green grass and sparse trees aroundas shown in figure 6:4.

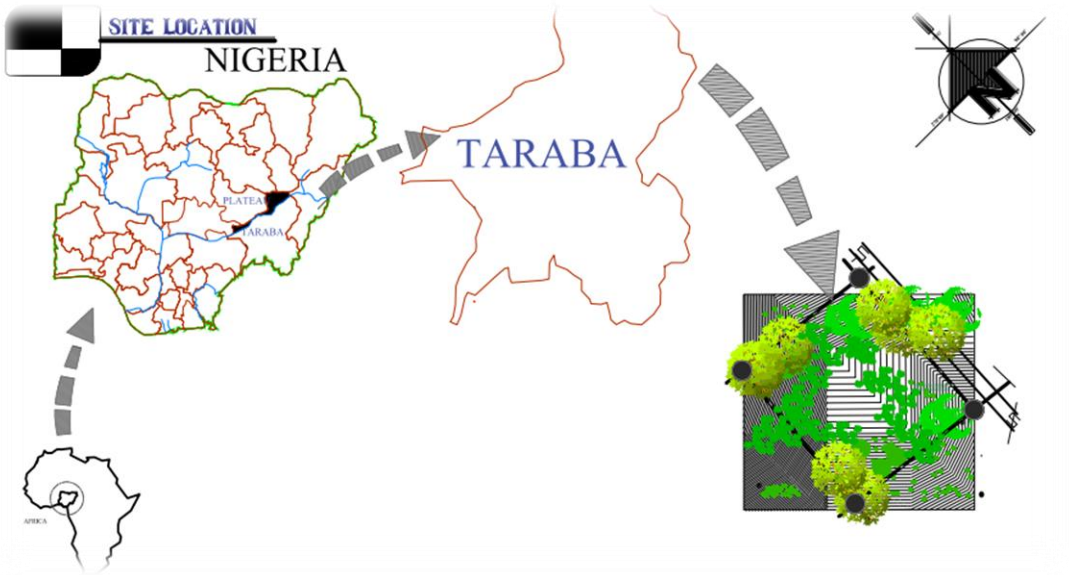


Figure 6:4 Site locations
Source: author's design work 2015

B. Analysis of the proposed site

The site was analyse base on some architectural impetus such as topography; climate; soil texture, constituent, composition, mixture and nature; wind speed; solar; and vegetation.

Topography: The study and mapping of the features on the surface of land, including natural features such as mountains and rivers and constructed features such as highways and railroads.

Climate: The average weather or the regular variations in weather in a region over a period of years as shown in figure 6:5.

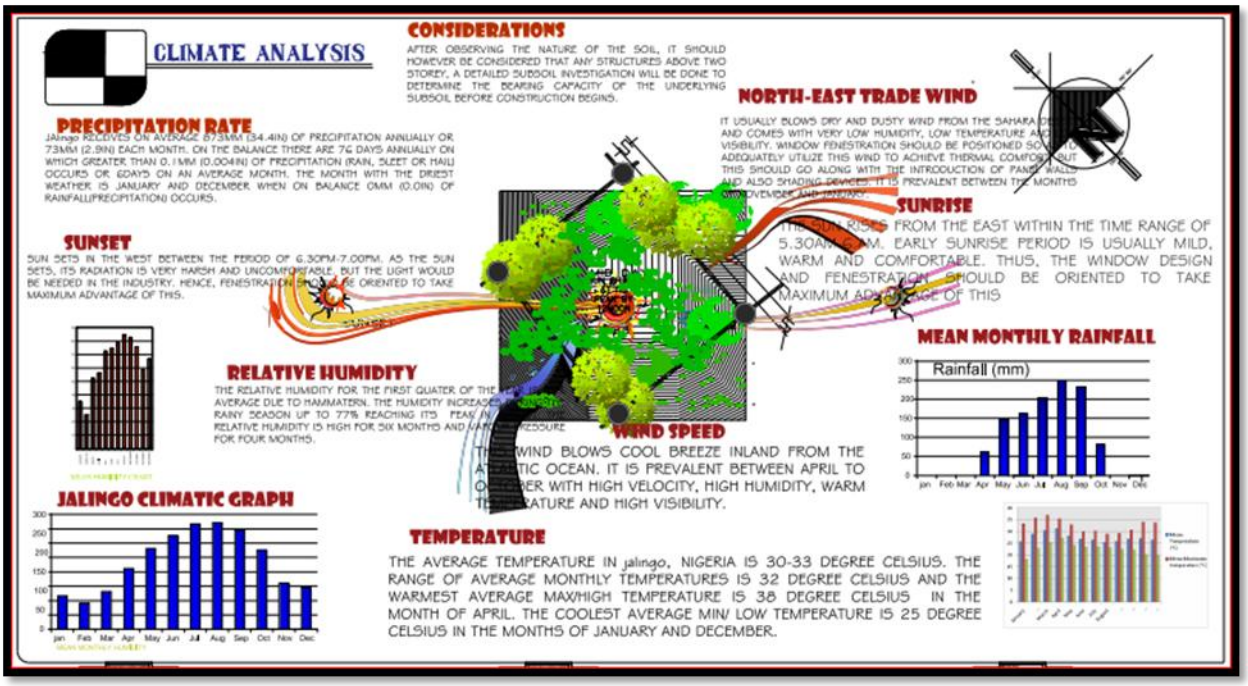


Figure 6:5Climate Analyses
Source: author's design work 2015

Soil: the top layer of most of the Earth's land surface, consisting of the unconsolidated products of rock erosion and organic decay, along with bacteria and fungi as shown in figure 6:6.

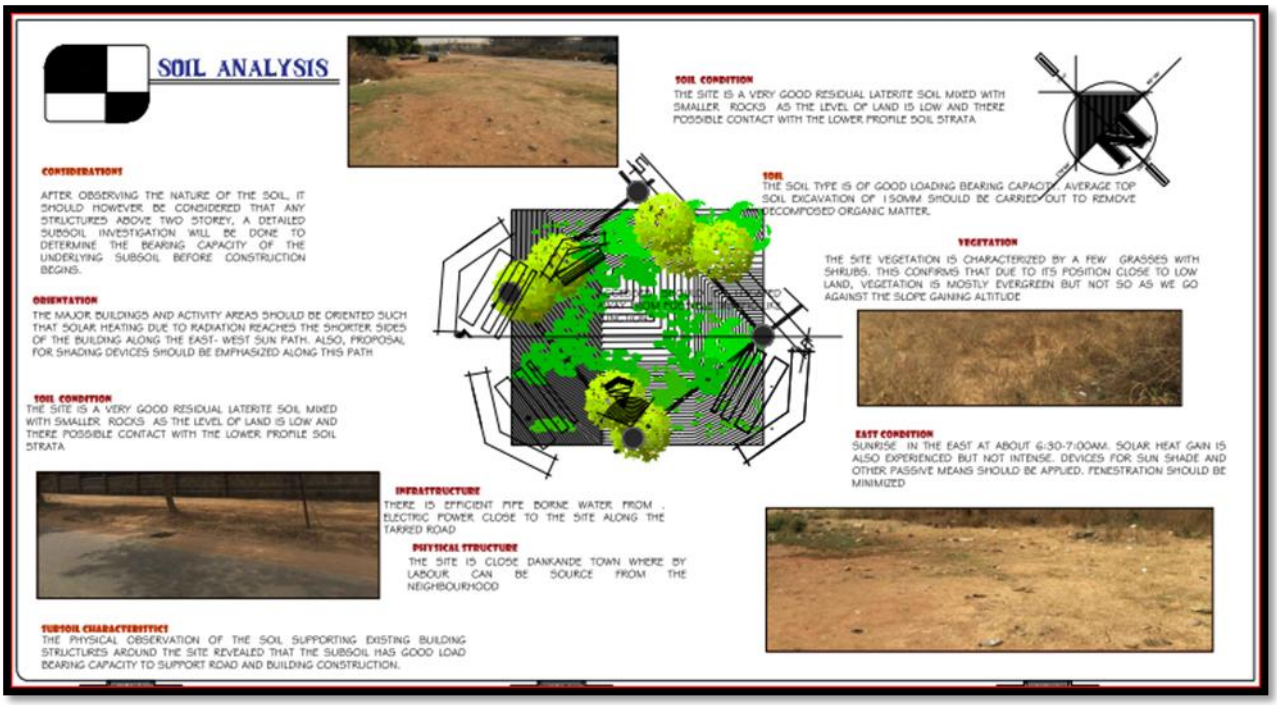


Figure 6:6Soil Analyses
Source: author's design work 2015

Solar: Relating to or originating from the Sun as shown in figure 6:7.

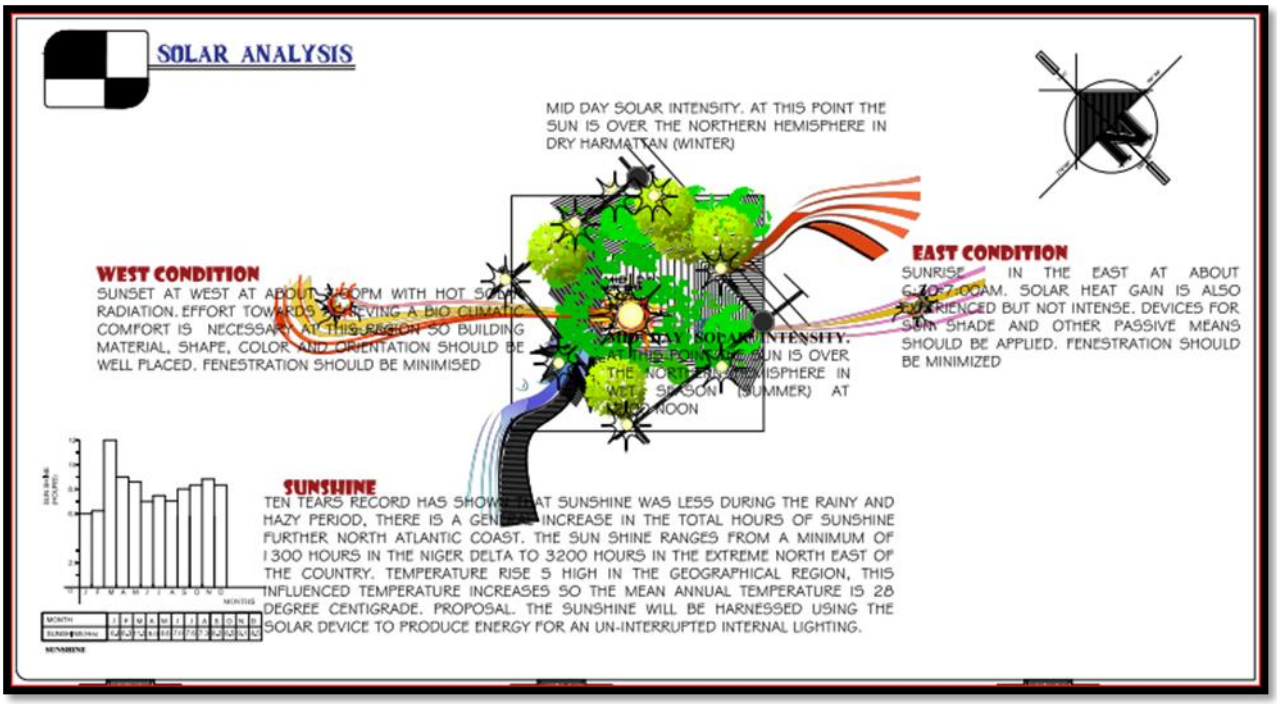


Figure 6:7Solar Analyses
Source: author's design work 2015

Vegetation: General: plants in general or the mass of plants growing in a particular place as shown in Figure 6:8.

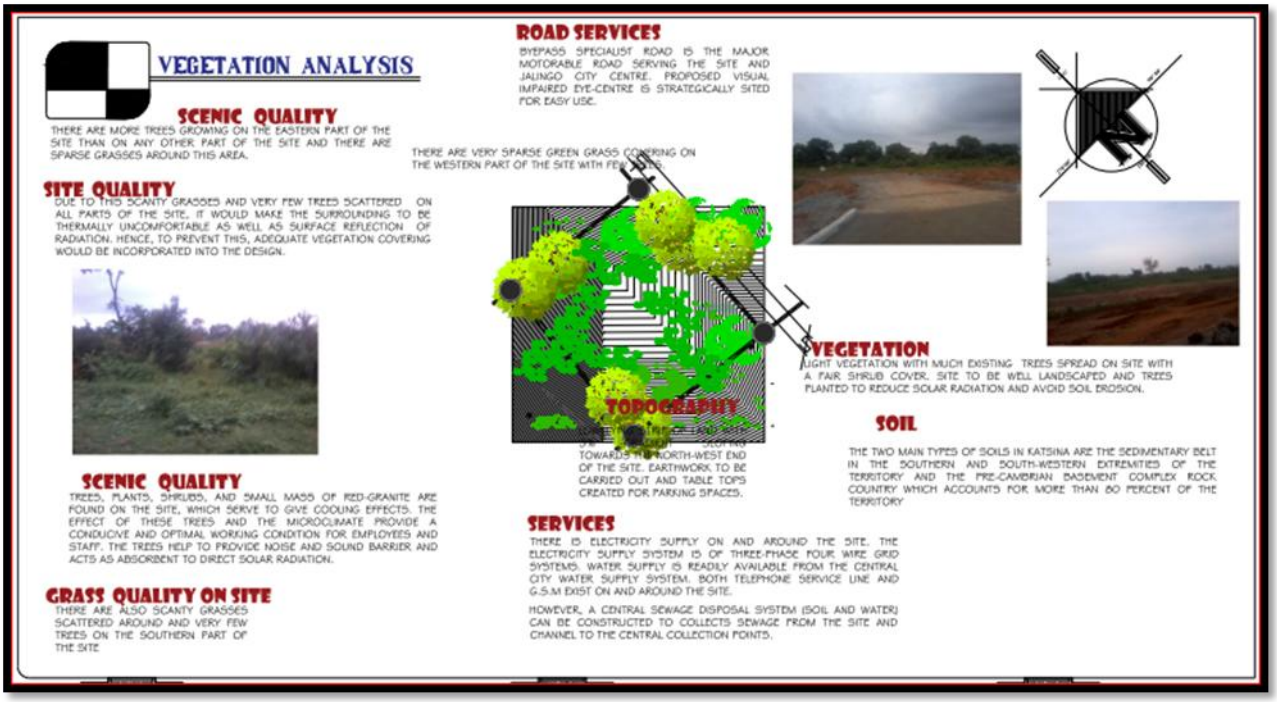


Figure 6:8Vegetation Analyses
Source: author's design work 2015

C. Topography

Considering the size of the land, the site can be said to be relatively flat. However, the lowest level on the site is -500mm to the west of the site and the extreme end of the north-East while the highest level is 1850mm towards the east side of the site. There is also a little depression to zero level towards the centre of the site as shown in figure 6:9.

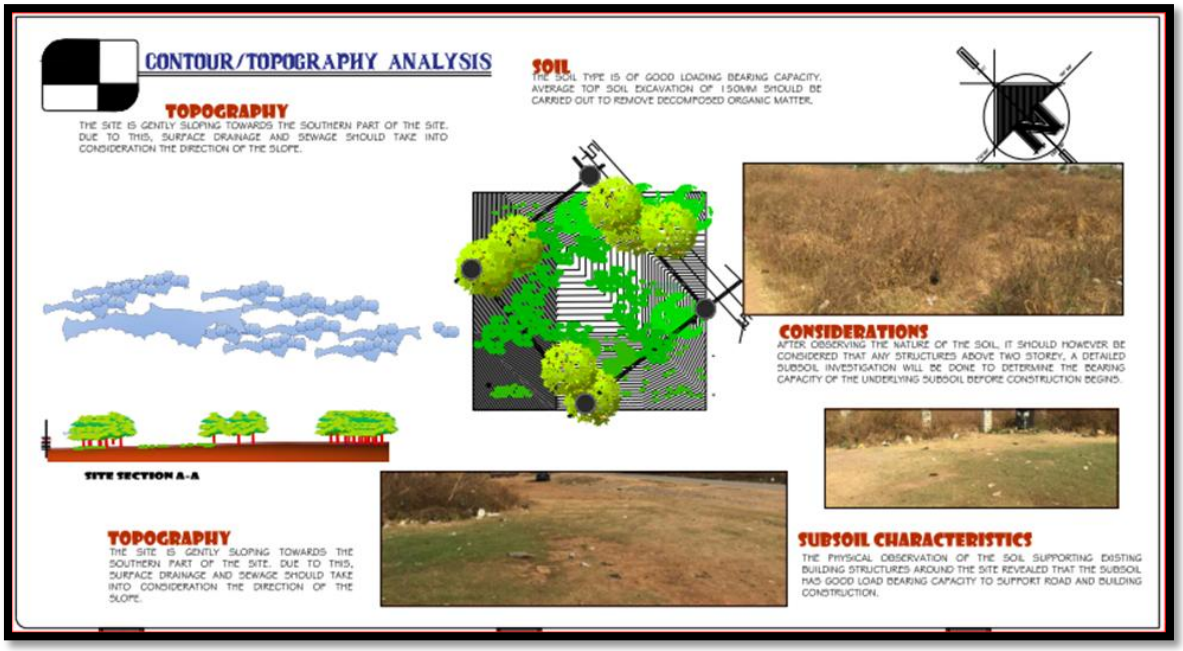


Figure 6:9Contour/Topography Analyses
Source: author's design work 2015

D. Site Development Concept

After the intensive studies of the site, and it analysed a site development concept was proposed taking allnecessary deterrents into consideration. The concept was developed using the newmodel of visually impaired person oriented design and planning of this centreas shown in figure 6:10.

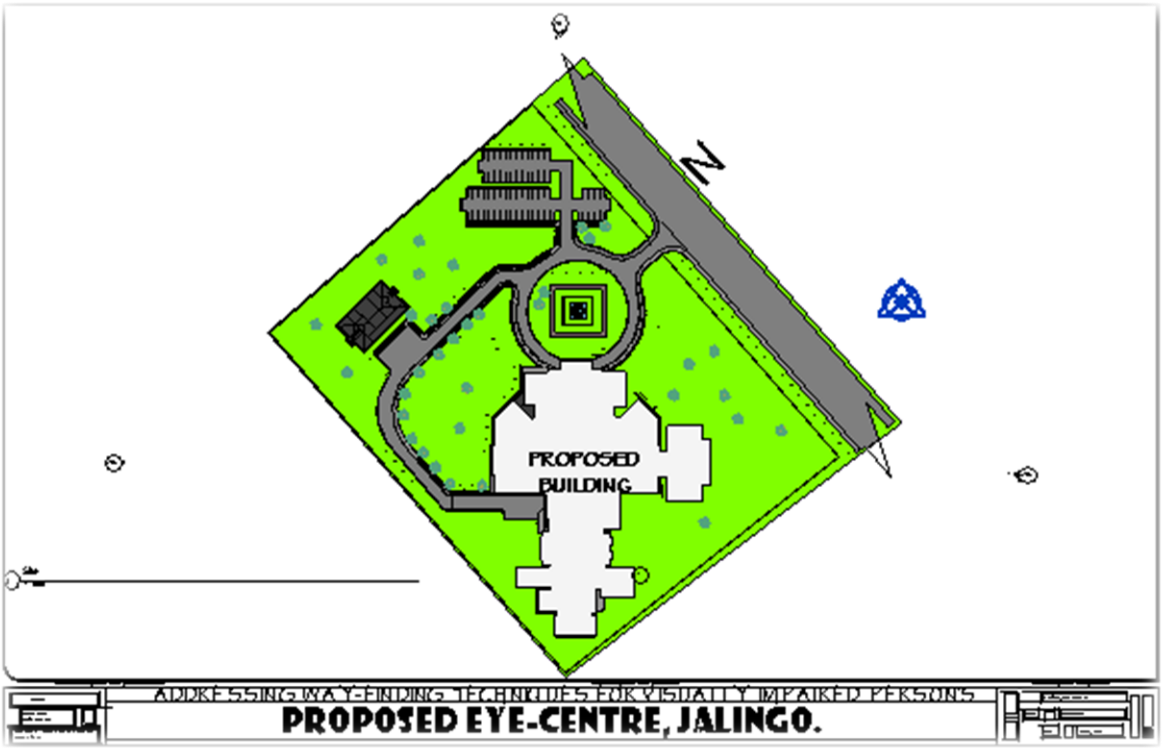


Figure 6:10 Proposed site Plan
Source: Author's fieldwork 2015

6.5.2 Proposed Architectural Design

A. General Out-patient Department (GOPD)

In the proposed G.O.P.D. was designed to be located in such a way that it can be identified by visitors and patients, be it first time or referred patients. The centre has a reception/enquiry at the entrance, has two card rooms namely; one for National Health insurance scheme and general card room, cashier's point, pharmacy examination rooms, injection room, admission and discharge office, record department, and waiting areas. The GOPD was also designed with large circulation area and with high headroom and large window openings for proper airflow due to large number of patient at a time.

The general out-patients department is the area which deals with admitting of patients into the centre. It provides partial consultations/examinations and treatments for patients that require little or no recovery services. GOPD is the first point of contact as one enters into hospital; therefore it is best positioned at a place that can be accessed directly from the main hospital entrance. GOPD in eye centre did not work like in the general hospital were by, consultations and treatment take place by a nurses or a doctor but in eye-centre all consultations takes place in clinics.Rather the place collects information and direct inpatient or outpatient to appropriate quotaas shown in figure 6:11.

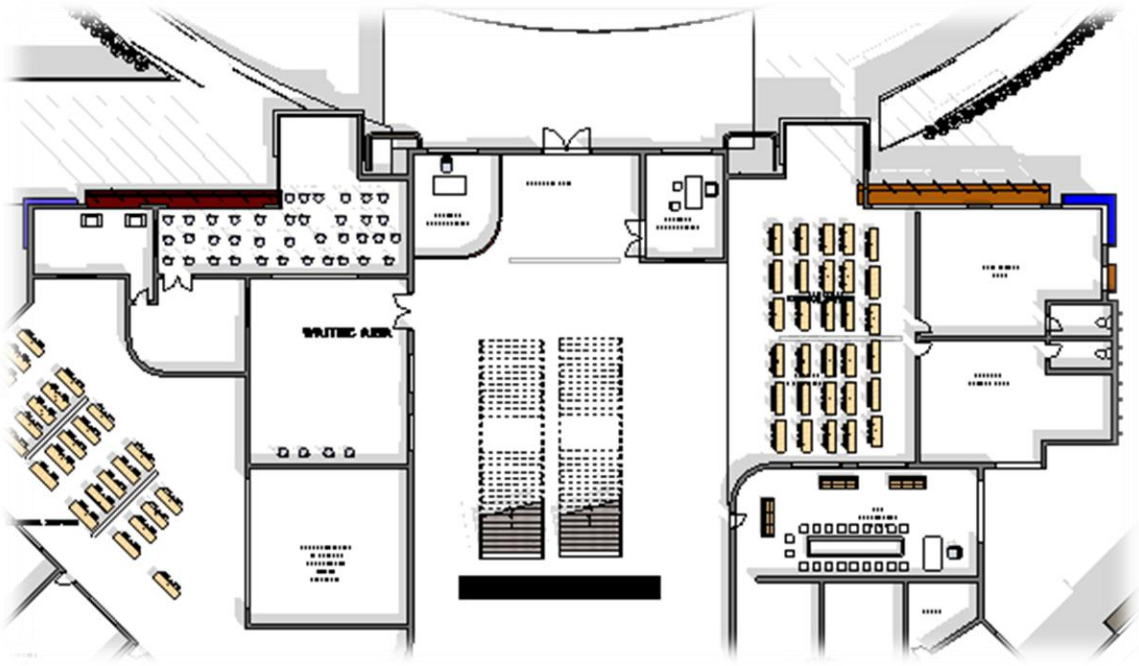


Figure 6:11 General out-patients Department (GOPD)
Source: Author's fieldwork 2015

C. Clinics

As a general practice clinics are they place were patients are provided with distinctive medical care where as in general hospital it take place in consultant office, emergency or

GOPD, in eye-centre patients can pass directly from GOPD to the clinics for diagnosis and treatment.

The clinics provided for these centre are; glaucoma clinic, emergency and physical injuries clinics, cataract clinic and Onchocerciasis clinic. The clinics serve almost same functions with the GOPD so the entire functions was placed on the ground floor so to grand ease of access, location to a first time patient and visitors in to the centre most especially the visually impaired which the centre was specifically for them. The clinics were designed with their waiting area, consultations/examinations.The GOPD harbour's the pharmacy, waiting areas two card room one for NHIS and general card roomas shown in figure 6:12 and figure 6:13.

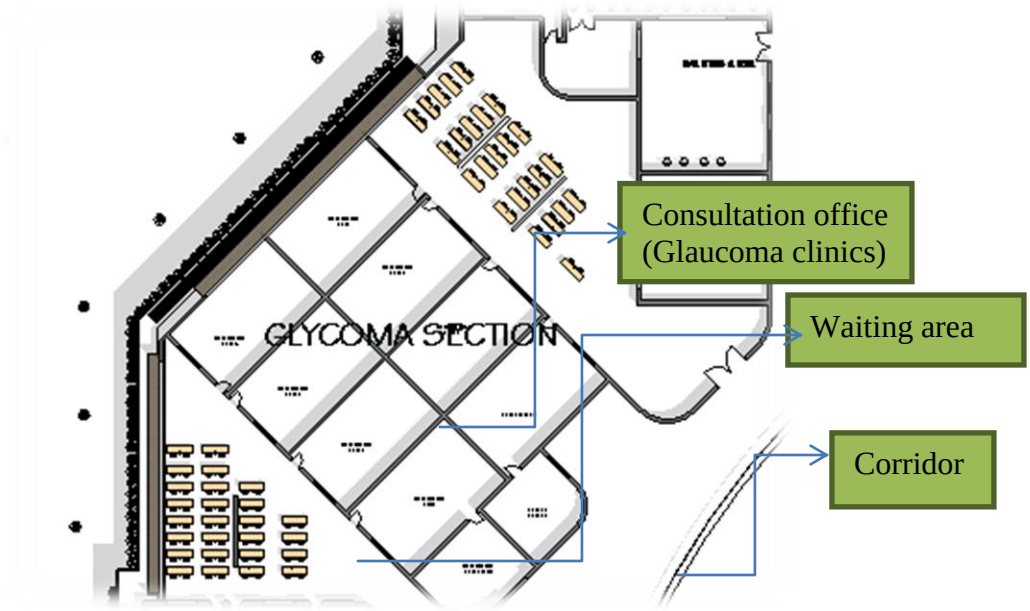


Figure 6:12Glaucoma clinics
Source: Author's fieldwork 2015

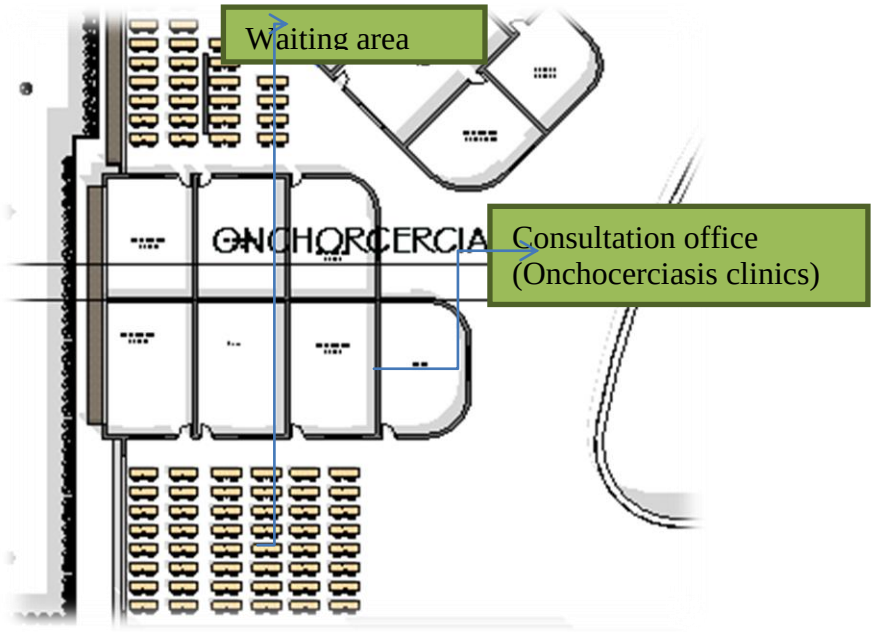


Figure 6:13Onchocerciasis clinics
Source: Author's fieldwork 2015

D. Theatre laboratory and Accident and Emergencyunits

These section inthe eye-centre is call the theatre were all theatre or surgical related functions takes place, Theatre and laboratory units department is a the place were accident and emergency patients are rush to for quick medical attention, it comprises of operating suites, scrub-up areas, clean and dirty utility rooms, recovery rooms, intensive care units, doctors' lounge and patients' changing, stores, waiting area.In this proposed eye-centre design, two operating suites were provided, one of which is for minor eye surgery, and the other are for general eye surgery case.The theatre and laboratory units is located in between the clinicand wardsso that patients need not to be transported a long distance to their allocated wards.All other important spaces were incorporated in the designas shown in figure 6:14.

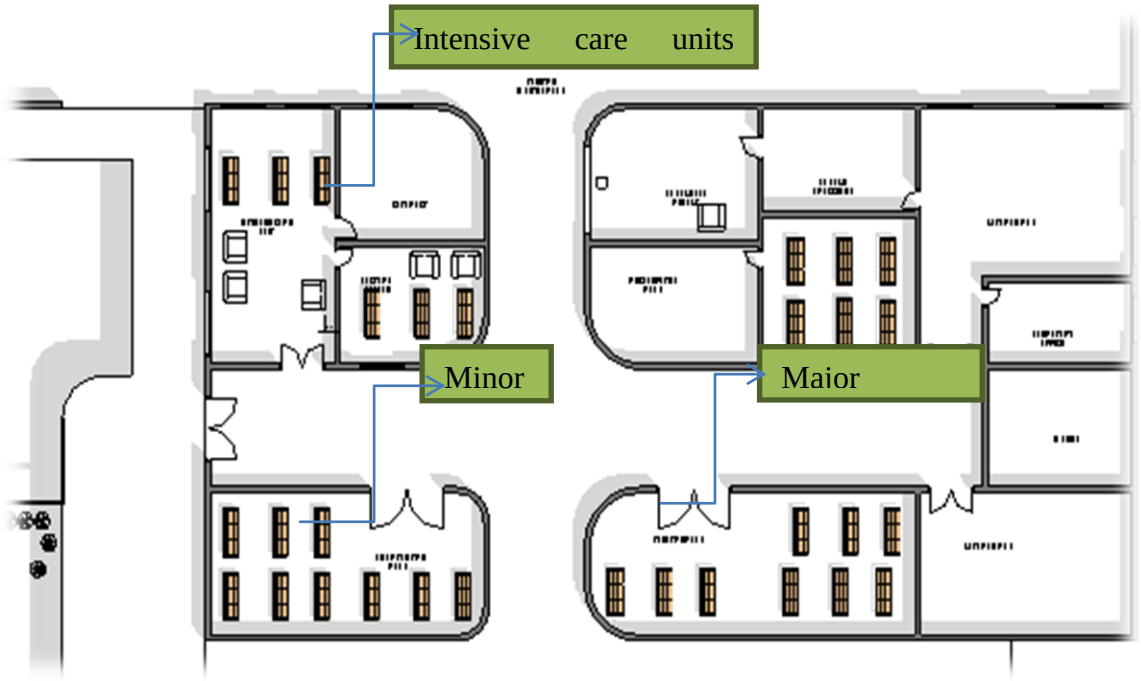


Figure 6:14 surgical/ theatre unit
Source: Author's fieldwork 2015

A. Laboratory

The laboratory in this centre is concerned mostly with the preparation and processing of blood, urine and skin samplesHaron, & Hamid, (2011).

In the proposed design, the laboratory was designed closely related with the theatre due to importance,and connectivity of service, thesegive room for access from all parts of the centre to allow patients from GOPD and wards have good,short access and distanceto cover with sample for testing and processing. The laboratory has waiting area, an office for collection of samples and results.

It also has sample collection unit for patients,the laboratory room was compartmentalized into units depending on the type of test to be carried out, such units are; haematology, chemical pathology, and dermatology.Other important spaces in the laboratory were also incorporated in the designas shown in figure 6:15.

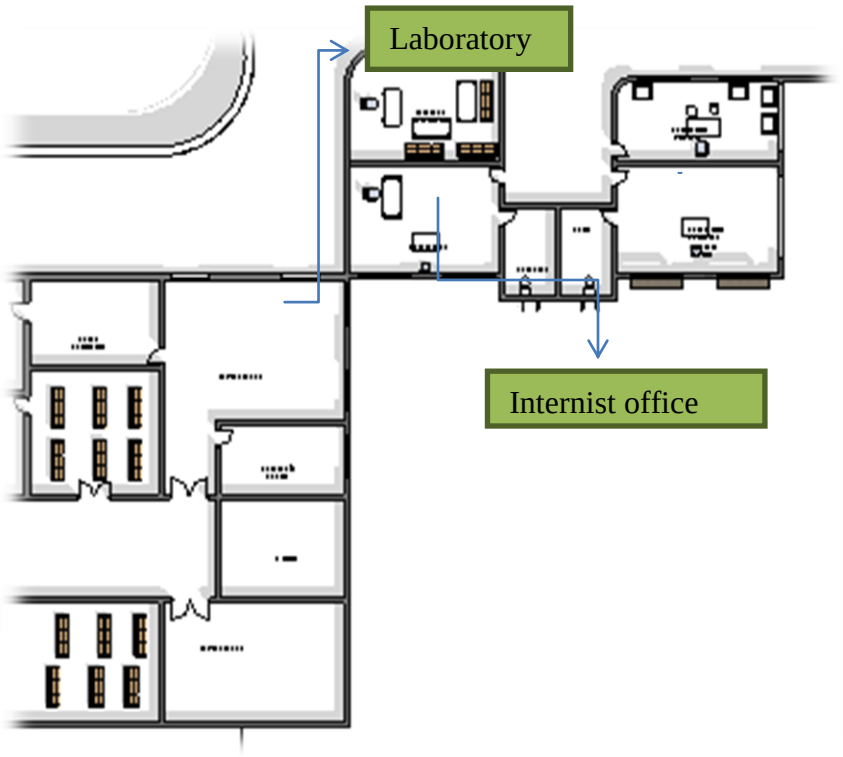


Figure 6:15laboratories
Source: Author's fieldwork 2015

B. Accident and Emergency

The accident and emergency sub-unit is collection centres were patients that require urgent attention are being brought. The sub-unit consists of emergency treatment room, recovery room and other supporting facilities. The entirecentre hasclose proximity to the surgical units.

In the proposed design, the sectionis provided with ambulance bay, intensive care units (ICU), consultation/examination room, casualty theatre, recovery room and important spacesas shown in figure 6:16.

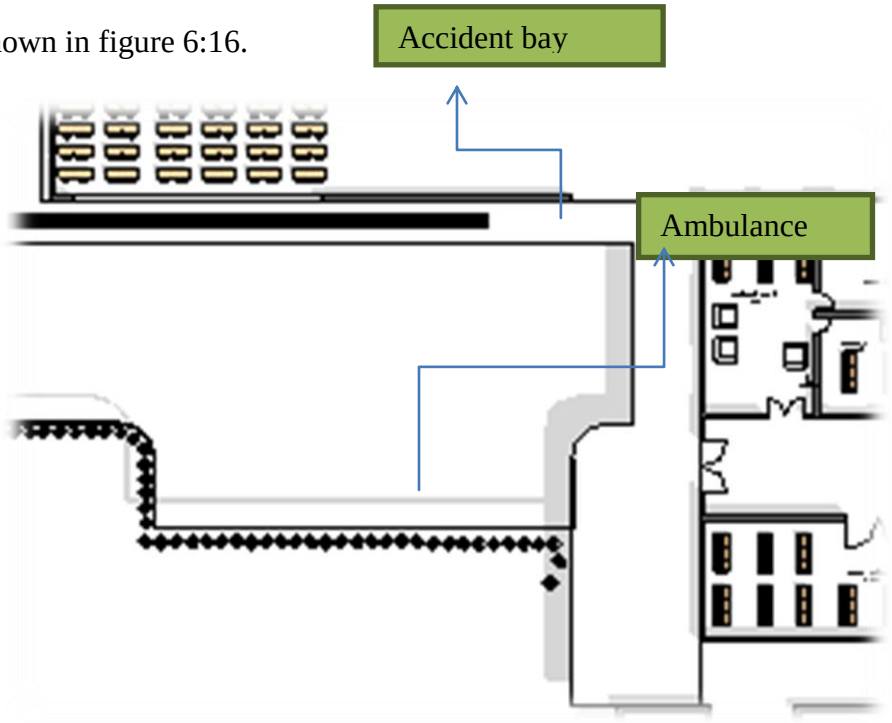


Figure 6:16 accident and emergency bay
Source: Author's fieldwork 2015

C. Inpatientsection

These are wards where patients are admitted; the design provided different requirements for patients depending on the nature of the patients' ailmentcataract, onchorcerciasis, and Glaucomaand status in the society.

The wards were categorized based on gender and paediatric wards which is closely related to female wards. The wards are basically of two building typology, the first is single rooms and general ward, the single rooms are 8 on ground floor in number for male and 8 on the ground floor and 8 on the first floor and 8 on ground floor for females and, general wards for both male and female, paediatric general wardas shown in figure 6:17.

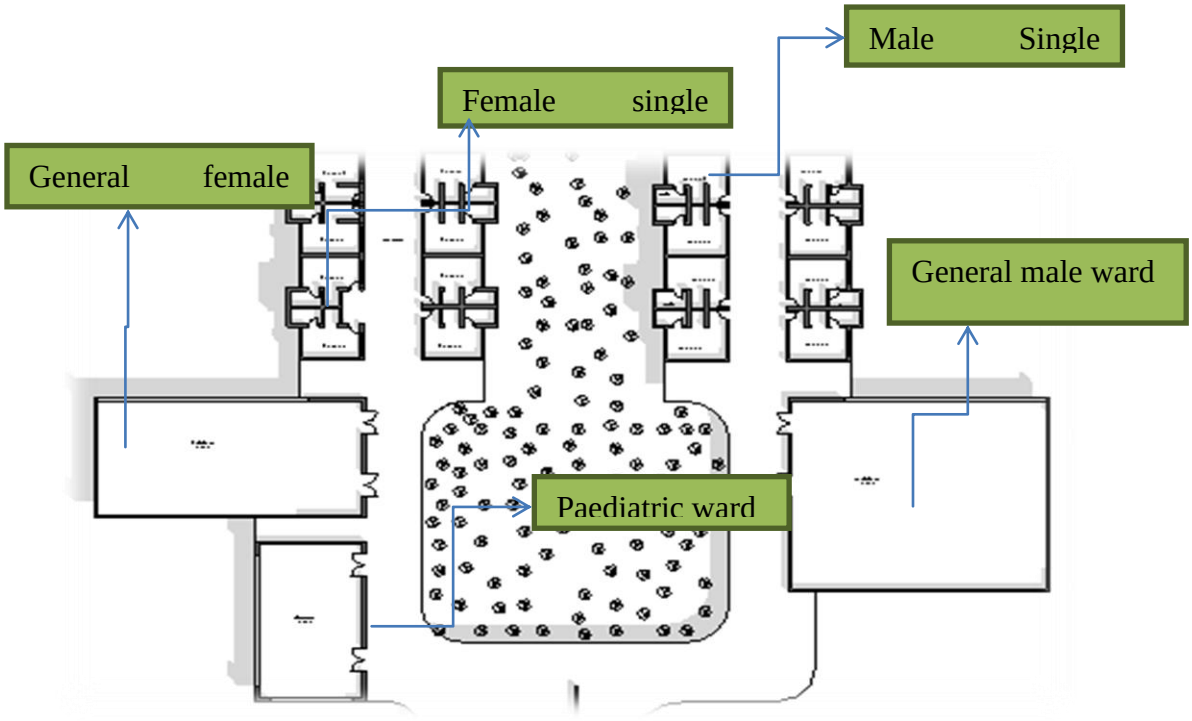


Figure 6:17 inpatient section
Source: Author's fieldwork 2015

6.6 Conclusion

This is chapter design report proposed a design showing in detailed all the five clinics as results off variables obtained from literature reviewed, and case study. The chapter shows they designed framework of a typical hospital in Nigeria,give a descriptiveanalysis ofthe site studied.

7.0 CONCLUSIONS AND RECOMMENDATIONS

7.1 Introduction

The purpose of undertaking this study was to create or produce a style to future changes in the design of eye-centre for visually impaired in the health sector in order to bring about shift from the current state of making visually abled person show to visually challenge where and where not to go in our healthcare facilities. However, a research titled "addressing way-finding techniques for visually impaired person" revealed that visual impaired also need to be incorporated in to the planning and design of any medical facility thereby giving the visual impaired sense of belonging in the facility from outpatient and inpatient related cases, diagnostic and treatment related cases, Administrative functions, teaching and research related functions, inpatients related functions, services related functions and finally to wards and daily mobility related activity.

7.2 Summary

The aim of this study is to addressing way-finding techniques for visually impaired person in the design of eye-centre Jalingo. The objectives of the study are as follows: To identify the nature of the different type of visual impairment, secondly to identify techniques employed by visually impaired person to find their way around, thirdly to identify the activities and the facilities the visual impaired person requires getting around a built up space, lastly to proposed a model that will guide in the design of space useable by visual impaired person.

At the end of the study the following objectives were achieved, to identify the nature of the different type of visual impairment. This was obtaining from rigorous studies of finding from other studies carried out:Blindness 3/60, NormalVA of 6/12, Moderate Visual ImpairmentVA of 6/18 to 6/60, Mild VisualImpairmentVA of 6/12 to 6/18, Severe Visual ImpairmentVA of 6/60 to 3/60.

The secondly to identify techniques employed by visually impaired person to find their way around, at the end of the research mobility of visually impaired is fully understand from the local perspective and how to improve their understanding of space, by the provision of tactile ground surface indicator (TGSI),Paths and circulation, Landmarks or markers, Nodes, Edges &, Zones or districts (Lynch, 1960), Colour as tool for Way-findinganimals for Way-finding.

To proposed a model that will guide in the design of space useable by visual impaired person. After the study a design was made to serve as template in the design of an eye-centre.

7.3 Contribution to Knowledge

1. The study addressing way-finding techniques for visual impaired person in the design of eye-centreJalingo being the first of its kind set a new line of architectural research, upon which other researches can build up.
2. The study also established new bases or facts about blindness and visual impaired in a built up space, in complex building on how to find their way in and out of the facility be it hospital, school or market, that were not established before by other

researches, The research also established a new classical sample or a new design framework.

3. The study also demonstrated the final outcome of the research in the design of an eye-centre for visual impaired person.

7.4 Recommendations

As visually impaired persons are part and parcel of our society certain sense of accommodations should be provided for them in all119architectural design to avoid seclusions.As an established fact that visually impaired person must be part of our society designinga space with some degree of conducive atmosphere for both the legitimately declare blind and partially blind, it's highlypraise the provision of additional facilities and make it become part oftherulesand regulations governing institutional design so that it can be forceintopractice.

1. Various professional bodies within building industry shouldcompel it members to comply with the article 9 of UN Convention on the Rights of Persons with Disabilities (UNCRPD).
2. The government body saddle with the responsibility of approval not approved any building that does not inculcate devices that not aid the movement of people with visually challenged.
3. An institutional edifice meant to provide any type of services to individual access to both visually challenge and visual abled to have equal opportunity to make use of the facility.

7.5 Areas for Further Research

The study addressing way-finding techniques for visually impaired person in the design of an eye-centre, Jalingo was conducted in Ahmed Bello University Zaria.So if any person or group of person that want to go into further study onway-finding techniques for visuallyimpaired should consider it in schools, i.e. university, polytechnic or college setting.

The researches can also optimizing way-finding techniques for visually impaired person in the design of in market centre, i.e. shopping malls, open market.

More research should be encouraged on tactile ground surface indicator1. Directional surface indicator 2.Warning surface indicator 3.Wall surface indicator 4.Haptic information 5.Short haptic information 6.Long haptic information 7.Use of high kerbs and paved walk way 8. Avoid the use of culvert

7.6 Conclusion

This chapter conclusion and recommendation, introduction, since the research is meant to create useable space for visual impaired/blind person without help, then, it will be expected to answer the following questions: What are the different types of visual impairments? What are the techniques employed by visual impaired person to find their way around in accessing public space? How can design address issues of way-finding among visual impaired be produced? At the end the ofstudied space that willed provide navigation for visually impaired person access, sense of belongings within a space was achieved.

REFERENCE

Abdullahi, A. (2011). *An assessment of architectural curricula of selected Nigerian universities and its relevance to the building industry.(*Doctoral dissertation), Ahmadu Bello University, Zaria, 2011).

Accessible Design for the Blind (2000) *Detectable warnings: synthesis of U.S. and international practice.* Report for U.S. Access Board. Website: www.access-board.gov

Adebiyi, B.A. (2007) visual impaired education: Yesterday, Today, and tomorrow. Essays in education.

Aida E. A., Hanaee, T.,Parolin,B. (2012). Way-finding Performance of Visually Impaired Pedestrians in an Urban Area. *Real Corp 2012*.

Aina, L. O. (2001). Research in Information Sciences*: An African Perspective*. Ibadan.

American Printing House for the Blind.(2002). Distribution of eligible students based on the federal quota census of January 4, 1999 (fiscal year 2000). Retrieved March 8, 2003, from http://www.aph.org/fedquotpgm/dist99.html

Andrew, Y.&Szeto,J. (2006) *Blind and Visually Impaired*, *Assistive Technology* Published Online:DOI: 10.1002/0471732877.emd035

Apelt, R., Crawford, J., & Hogan,D. (2007) Way-finding design guidelines.

Awolola, J.A. (2000).*A practical guide to research writing*. Ilorin: Olad.

Behkami, N. A. & David,A.D. (2009).User centered design in complex healthcare workflows: *the case of care coordination and care management redesign*". *AMIA 2009 Symposium Proceeding*, 39-43.

Blind Survey.(2005-2007). *The Nigeria national blindness and visual impairment survey. Nigeria*: Nigeria Government.

Burgess, R., Dumais, J.,Franklin, S.,Gough, H.,&Walker, C. (2003). Survey Methods and practices. Ottawa: Satatistics Canada.

Carr, R. F. (2011). Whole Building Design Guide: *Health Care Facilities*. Washington

Chao, L. (2004) Spatial Ability, Urban Way finding and Location-Based Services: a review and first results: London.ucl.

Chen, C., You, M.,Chiou, Y. (n.d.) Psycho-Pleasurability of Maps for Way-finding: NSC91-2213-E-224-021 from the National Science Council in Taiwan.

Cyril M. H.(2015) *Dictionary of Architecture and Constructions* Fourth Editions.Disability Rights Commission, UK, 2006.

Downs, R. &Stea, D. (eds.). (1977). Maps in Minds, New York: Harper and Row.

Durdin, P., &Hughes, T. (2003) Tactile Ground Surface Indicators & Audible Tactile Traffic Signals.*Revision of RTS 14: Guidelines for Installing Pedestrian Facilities for People with Vision Impairment*. IPENZ Traffic Management Workshop – Christchurch 2003 Technical Paper.Eguzoikpe.

Eiselen, R., &Uys, T. (2005).Questionnaire design. Johannesburg.

Estill& Associates (2006).*Site Selection Community Consultation Report.*Washington: Department of Health.

Evans Y. & McCoy, H. (1998).User centered design in complex healthcare workflows: the case of care coordination and care management redesign". AMIA 1998Symposium Proceeding, 39-43.

Ferrell, K. (2007).Issues in the Field of Blindness and Low-Vision, NCLID@UNCO French, R. (1997-2007) visual impairment.

Foster A., &Noe,C. (2008).*Promoting access To the Built environment*: *Guidelines*. 64625 BensheimGermany:NibelungenstrasseP 124.

Fritz, J., Way, T.,&Barner, K. (1996) Haptic representation of scientific data for visually impaired or blind persons. Paper presented at the Technology and Persons with Disabilities Conference. Giess, C., Evers, H. &Meinzer.

Gaunet, F. &Briffault, X. (2005) Exploring the Functional Specifications of a Localized Way-finding Verbal Aid for Blind Pedestrians: Simple and Structured Urban Areas.

Glenn, B. T. &Chignell, M. H. (1992). Hypermedia: Design for browsing. In H. R. Hartson& D. Hix (Eds.), Advances in Human-Computer Interaction, Vol. 3. Norwood, NJ: Ablex Publishing Corp.

Golledge, R., Klatzky, R.,& Loomis, J. (1996) 'Cognitive mapping and way-finding by adults without vision', in J. Portugali (ed.), the construction of cognitive maps. The Netherlands: Kluwer.

Golledge, R.G. &Stimpson, R. J. (1997).*Spatial Behaviour: a geographic perspective.* New York: The Guilford Press.

Golledge, R.G. (ed). (1999). *Way-finding Behavior: Cognitive Mapping and Other Spatial* Guide for places of lodging: serving guests who are blind or who have low vision.(2001) *U.S. Department of Justice Civil Rights Division Disability Rights Section*.

Haron, S. N & Hamid, M. D.Y. (2011). Quality of Hospital In-use: Usability Evaluation Method as an Assessment: *Journal of Sustainable Development* Vol. 4, No. 2; April 2011.

Haron, S.N., Hamid,M. Y. &Talib,A. (2010).*Towards Health-Care service quality: An adaptation usability concept in healthcare design.* Proceedings of Arte-Polis 3 International Conference on Creative Collaboration and the Making of Place.Bandung.

Haron, S.N., Hamid,M. Y.,&A. Talib. (2010). Towards healthcare service quality: an understanding of the usability concept in healthcare design. *Proceedings of ASEAN Conference on Environmental-BehaviourStudies*,Sarawak.

Hassard, J. (n.d.) Considerations for planning and modifying roads for people who are vision impaired, Royal Victorian Institute for the Blind, Melbourne.

Heath D. A., Amos, J. F. & Miller,S.C. (2010). O*ptometric clinical practice guideline:*Care of the Patient with visual Impairment (Low Vision Rehabilitation).American optometric associations, Lindbergh Blvd., St. Louis, MO 63141-7881

Helvacıoğlu, E., &Olguntürk, N. (n.d.).Colour and way-finding. Paper presented at Bilkent University press Ankara.

Holscher C., Meilinger,T.,Vrachliotis, G.,Brosamle, M.,Knauff, M. (2007). Up the down staircase: Wayfinding strategies in multi-level buildings.journal of environmental psychologu 26 (2006) 284-299.

http://www.visionaware.org/info/everyday-living/essential-skills/an-introduction-to-orientation-and-mobility-skills/123 retrieved on 19th march, 2016

Huebner, K. M., &KoenigA. J. (n.d.). Student-centered educational placement decisions: The meaning, interpretation, and application of least restrictive environment (CEC/DVI position statement). Retrieved February 4, 2002,from.http://www.ed.arizona.edu/dvi/Postion%20Papers/student_centered.htm.

Huelat, B.J. (2007) way finding: design for understanding: *A Position Paper for the Environmental Standards Council of The Center for Health Design.*califonia.

Hunter S. (2010).Design resource: center for inclusive design and environmental access Architectural Way-finding IDeACenter, New York: University at Buffalo.

Issa, A. O. (2004). *Research methodology.*In practical guides to project writing For Students in Polytechnics, Colleges and Universities.Department of Library and Information Science Federal Polytechnic, Offa.

Jadoon Z, Shah, S.P., Bourne, R.,Dineen B., Khan M.A., Gilbert C.E., Foster A., Khan M.D. (2007). Cataract prevalence, cataract surgical coverage and barriers to uptake

of cataract surgical services in Pakistan: the Pakistan National Blindness and Visual Impairment Survey. *Br J Ophthalmol*. 2007 Oct; 91(10):1269-73. Epub 2007 Jun 7.

Jansson, G. (1990). Nonvisual guidance of walking.In R. Warren & A. H. Wertheim (Eds.), *Perception and control of egomotion* (pp. 507–521). Hillsdale, NJ: Lawrence Erlbaum Associates, Inc.

Kothari, C.R. (2004)Research methodology:methods and techniques 2nd rev. ed 2004, New Age International (P) Ltd., *Publishers Published by New Age International* (P) Ltd., Publishers.

Kroll K. (2004) vital designs florida hospital waterman uses design to put patients at ease - and to support medical care to help them heal.

Kurniawan, H. (2011). *Familiarity in Designing a Mosque: A Practice of Universal Design.* Paper UIA World Congress 2011, Work Programme Architecture for All, Tokyo , Japan.

Kurniawan, H., R.T. Maharani, H. S., Rahmawati, A. (2014) Blind People Behaviors to the Architecture of *SekolahLuarBiasa (Slb)* MtsYaketunis

Kyari F., Gudlavalleti, M. V. S.,Sivsubramaniam S., Gilbert C. E., Mohammed M. A.,Entekume G., Foster, A. (2009) The Nigeria national blindness and visual impairment study group*:* Prevalence of blindness and visual impairment in Nigeria: *The national blindness and visual impairment survey.http://iovs.arvojournals.org/*

Kyari,F.,Gudlavalleti, M.V.S.,Sivsubramaniam, S.,Gilbert, C.E., Abdull, M. M.,Entekume, G., Foster, A.(2009). The Nigeria National Blindness and Visual Impairment Study Group Prevalence of Blindness and Visual Impairment in Nigeria (2009): The National Blindness and Visual Impairment Survey:iovs, may 2009, vol. 50, no. 5.

Lahav, O. &Mioduser, D. (2003).A blind person's cognitive mapping of new spaces using a haptic virtual environment. *Journal of Research in Special Educational Needs*, 3(3), doi: 10.1111/1471-3802.00012

Lang, J. (2011). *Creation of architectural theory,* Translated by A. eini far; Fifth Edition, Tehran.

Lelhaj, R. &Sarbangholi, H.S. (2014). Gender factors influencing architectural design specific for disabled: *Kuwait Chapter of Arabian Journal of Business and Management Review Vol. 4, No.4; December. 2014*

Lina-Zhou , J. (2012). *GIS-Based Multi-Criteria Analysis for Hospital Site Selection in Haidian District of Beijing.*Department of Industrial Development, IT and Land Management.

Lynch, K. (1960). *The Image of the City*. Cambridge: MIT Press.

Maina, J.J., & Umar, B. O. (2015) Way-finding in multi-level buildings: a study of the senate building, Ahmadu Bello University. *Paper presented at WABER Conference*. ACCRA, WABER.

Marquardt G., (2012) Way-finding for People with Dementia: The Role of Architectural Design; Volume 4, Number 2.

Marquardt, F. (2012).GIS-Based Multi-Criteria Analysis for Way-finding inHaidian District of Beijing, at WABER Conference. ACCRA, WABER.

Marston, J. R. (2002) towards an accessible city: empirical measurement and modeling of access to urban opportunities for those with vision impairments, using remote infrared audible signage: California.

Mau, S.,Nik, A. M.,Makatchev, M.,&Steinfeld, A.(2012).*Guidelines for facilities for blind*. CMU-RI-TR-07-39

Microsoft Encarta (2009). ®© *1993-2008 Microsoft Corporation.* All rights reserved.

Mike, J. (2014) *Guidelines for facilities for blind and vision impaired pedestrians*. 4rd Edition May 2015 Road and Traffic Standard Series.

Mollerup, P. (2009). Wayshowing in Hospital.*Australasian Medical Journal.*1(10),112-114.

Molly E., Sorrows, S.,Hirtle,C. (n.d.). The Nature of Landmarks for Real and Electronic Spaces: *School of Information Sciences*. University of Pittsburgh.

Muhlhausen, J. (2004) way finding is not signage: signage plays an important part of way-finding-but there' more.

Nada,A. A.,Fakhr, M. A., Seddik, A.F. (2014). Assistive Infrared Sensor Based Smart Stick for Blind people.

Obeka S. (2011) *Panacea of science education research.* Zaria: ABU Press

Okafor, G.O. (2002).*Communication Research.*InOkuna, C. S. ed. Teaching Mass Communication: A Multi – Dimensional Approach Enugu: New generation Books.

Oshodi, F. (2007).*Understanding research methods* .Lagos: Bimsmat NIG.

Passini, R., & Arthur, P. (1992).*Way-finding: People, signs and architecture*. New York: McGraw-Hill Inc.Processes, Baltimore, Maryland: The Johns Hopkins Univerity Press.

Read, M.A., (n.d) Use of colour in child care environments: application of colour for way-finding and space definition in Alabama child care environments. Alabama: *Early Childhood Education Journal*, Vol. 30, No. 4, 2003, pp. 233-239.

Resnikoff, S., Pascolini, D. (2004).Global data on visual impairment in the year 2002.*Bulletin World Health Organ* 2004; 82: 844-851.

Retrieved on 2015-07-12 19:39 from http://www.news-medical.net/health/types.

Retrievedon2015071219:39fromhttp://www.nzta.govt.nz/network/operating/environmental/docs/environmental - and – social – responsibility - policy.pdf.

Richardson, G. D. (1981).Comparing two cognitive mapping methodologies, Area, 13, 325-331.

Seckmeyer, G., Pissulla, D., Glandorf, M.(2008).Variability of UV irradiance in Europe.*PhotochemPhotobiol* 2008: 84: 172-9.

Selltiz, C. (2001), Research Methods in Social Sciences, 1962, p. 50.

Shitu, M. (2015). Evolving space standard for family caregivers in hospital design proposed Dandume general hospital, *published M.Sc. thesis*, Ahmadu Bello University, Zaria, Nigeria.

SHR–Saskatoon Health Region (2010) *Children's Hospital of Saskatchewan, Project Charter and Site Validation.*Saskatoon Health Region.

Soltani, A. &Marandi, E. Z. (2011).Hospital site selection using two-stage fuzzy multi-criteria decision making process.*Journal of Urban and Environmental Engineering*, v.5, n.1 p38.doi: 10.4090/juee.2011.v5n1.032043

Sprow, R. (2012). Planning hospital: chapter [1]Teaching Strategies for Students that are blind and Low Vision:Office for Students with Disabilities: Valencia.

The WHO global data on blindness for 2002.

Turano K. A., Yu D., Hao L., & Hicks J. C. (2011). Optic-flow and egocentric-direction strategies in walking: *Central vs. peripheral visual field*, *Vision Research*.

Ujo, A.A. (2002). *Understanding Social Research in Nigeria*. Kaduna: Anyaota Enterprises and Publishers Nigerian Limited.

Ungar, S., Blades, M. & Spencer, S. (1996). 'The construction of cognitive maps by children with visual impairments', in J. Portugali (ed.),*The construction of cognitive maps*. The Netherlands: Kluwer.

United Nations (UN) Convention (2006).On the Rights of Persons with Disabilities *(UNCRPD),* Approved by the General Assembly in December 2008.

Webster, N. (1983).Webster's new twentieth century dictionary of the English language. USA: *Encyclopedia Britannica,* Inc.

Weisman, J. (1981). Evaluating Architectural Legibility: *Way-finding and the Built Environment, Environment and Behavior,* v. 13(2): 189-20

Wilm, S., Foster A. &Noe C. (2008).*Promoting access To the Built environment*: *Guidelines*. 64625 BensheimGermany:Nibelungenstrasse 124.

World Health Organization. "Universal eye health: a global action plan 2014–2019." *World Health Organization* 2014.

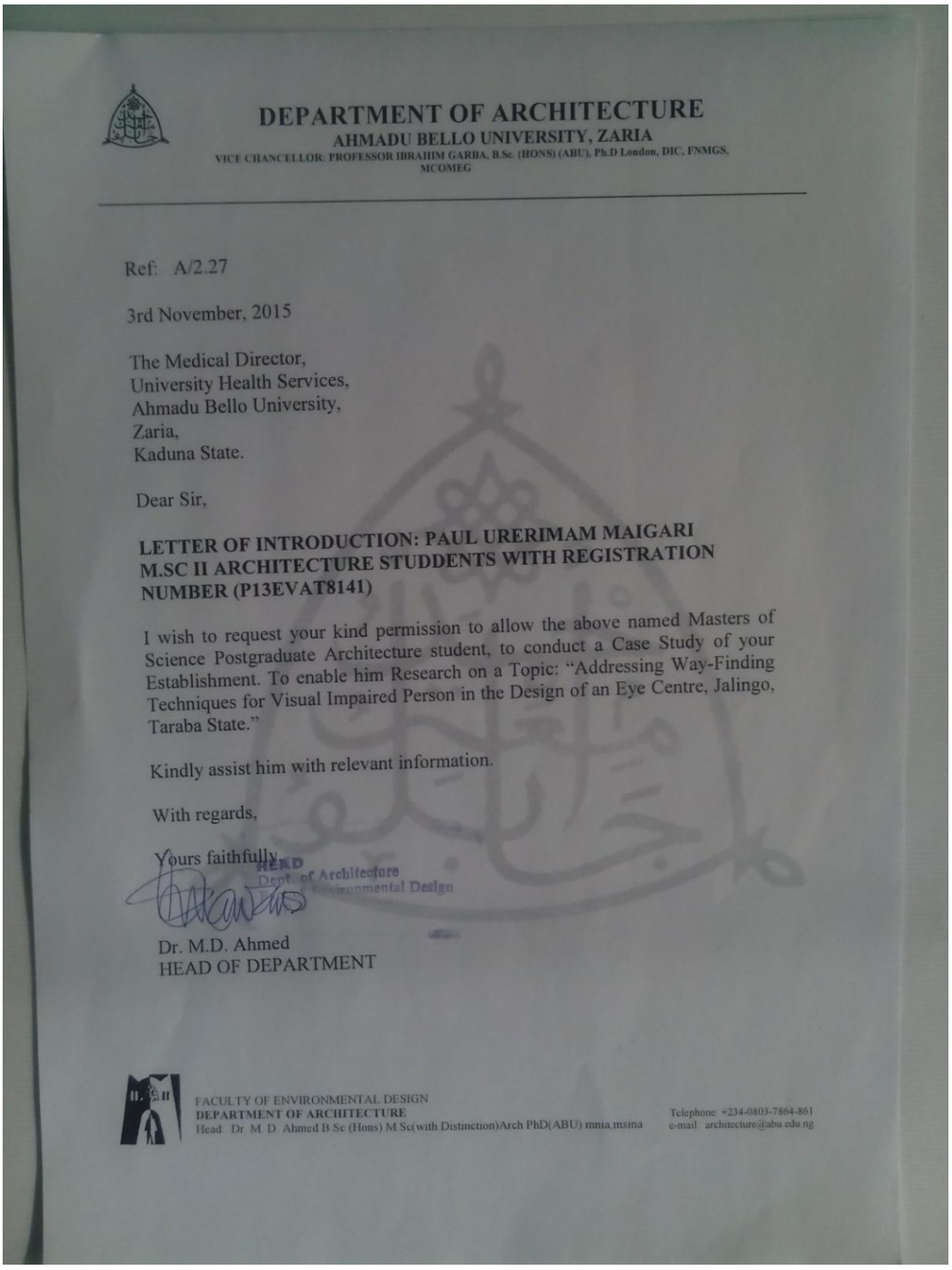
World health organization: Vision 2020 the right to sight Global initiative for the elimination of avoidable blindness: *Action plan* 2006-2011.

(adobe digital editions version.doi:10.1036/0071359723

1European Committee reports, (2012).

(http://www.ReportBD.com)

APPENDIX 1



DEPARTMENT OF ARCHITECTURE
AHMADU BELLO UNIVERSITY, ZARIA
VICE CHANCELLOR: PROFESSOR IBRAHIM GARBA, B.Sc. (HONS) (ABU), Ph.D London, DIC, FNMGS, MCOMEG

Ref: A/2.27

3rd November, 2015

The Medical Director,
University Health Services,
Ahmadu Bello University,
Zaria,
Kaduna State.

Dear Sir,

LETTER OF INTRODUCTION: PAUL URERIMAM MAIGARI M.SC II ARCHITECTURE STUDDENTS WITH REGISTRATION NUMBER (P13EVAT8141)

I wish to request your kind permission to allow the above named Masters of Science Postgraduate Architecture student, to conduct a Case Study of your Establishment. To enable him Research on a Topic: "Addressing Way-Finding Techniques for Visual Impaired Person in the Design of an Eye Centre, Jalingo, Taraba State."

Kindly assist him with relevant information.

With regards,

Yours faithfully,

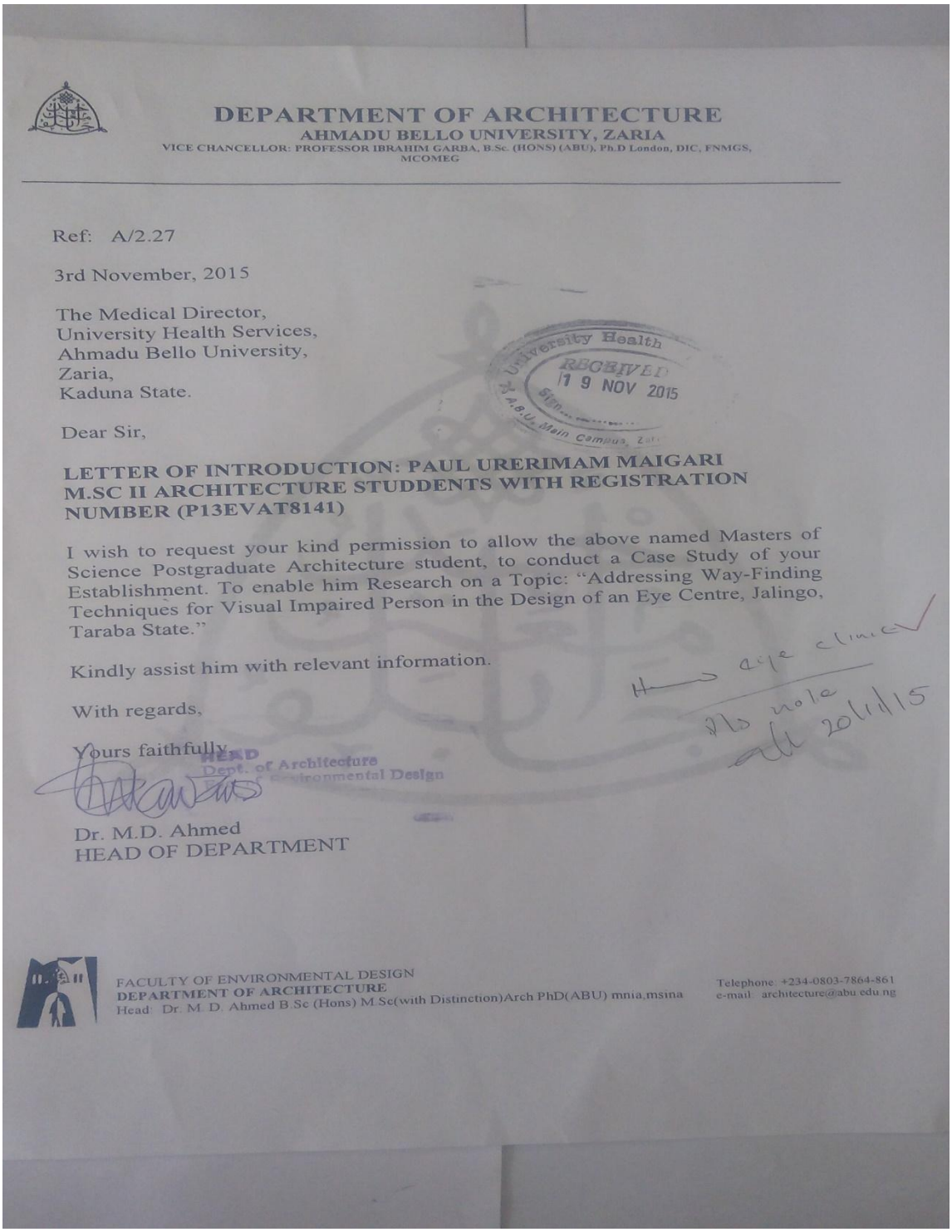
HEAD
Dept. of Architecture
Environmental Design

Dr. M.D. Ahmed
HEAD OF DEPARTMENT

FACULTY OF ENVIRONMENTAL DESIGN
DEPARTMENT OF ARCHITECTURE
Head Dr M D Ahmed B Sc (Hons) M Sc(with Distinction)Arch PhD(ABU) mnia,msina

Telephone +234-0803-7864-861
e-mail architecture@abu.edu.ng

APPENDIX 2



DEPARTMENT OF ARCHITECTURE
AHMADU BELLO UNIVERSITY, ZARIA
VICE CHANCELLOR: PROFESSOR IBRAHIM GARBA, B.Sc. (HONS) (ABU), Ph.D London, DIC, FNMGS, MCOMEG

Ref: A/2.27

3rd November, 2015

The Medical Director,
University Health Services,
Ahmadu Bello University,
Zaria,
Kaduna State.

University Health
RECEIVED
19 NOV 2015
A.B.U. Main Campus, Zaria

Dear Sir,

LETTER OF INTRODUCTION: PAUL URERIMAM MAIGARI M.SC II ARCHITECTURE STUDDENTS WITH REGISTRATION NUMBER (P13EVAT8141)

I wish to request your kind permission to allow the above named Masters of Science Postgraduate Architecture student, to conduct a Case Study of your Establishment. To enable him Research on a Topic: "Addressing Way-Finding Techniques for Visual Impaired Person in the Design of an Eye Centre, Jalingo, Taraba State."

Kindly assist him with relevant information.

With regards,

Yours faithfully,

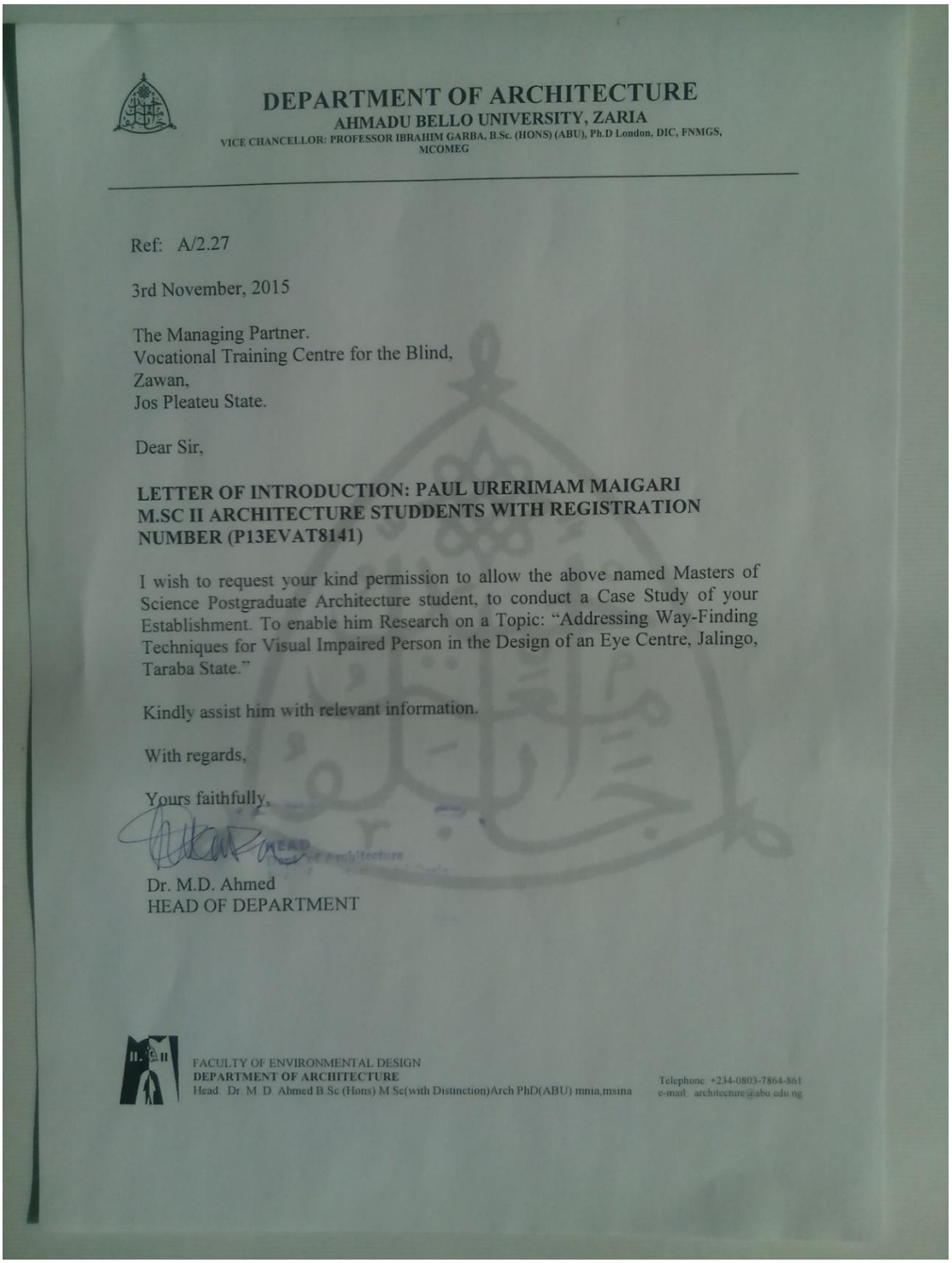
HEAD
Dept. of Architecture
Environmental Design

Dr. M.D. Ahmed
HEAD OF DEPARTMENT

FACULTY OF ENVIRONMENTAL DESIGN
DEPARTMENT OF ARCHITECTURE
Head: Dr. M. D. Ahmed B.Sc (Hons) M.Sc(with Distinction)Arch PhD(ABU) mnia,msina

Telephone: +234-0803-7864-861
e-mail: architecture@abu.edu.ng

APPENDIX 3



DEPARTMENT OF ARCHITECTURE
AHMADU BELLO UNIVERSITY, ZARIA
VICE CHANCELLOR: PROFESSOR IBRAHIM GARBA, B.Sc. (HONS) (ABU), Ph.D London, DIC, FNMGS, MCOMEG

Ref: A/2.27

3rd November, 2015

The Managing Partner.
Vocational Training Centre for the Blind,
Zawan,
Jos Pleateu State.

Dear Sir,

LETTER OF INTRODUCTION: PAUL URERIMAM MAIGARI M.SC II ARCHITECTURE STUDDENTS WITH REGISTRATION NUMBER (P13EVAT8141)

I wish to request your kind permission to allow the above named Masters of Science Postgraduate Architecture student, to conduct a Case Study of your Establishment. To enable him Research on a Topic: "Addressing Way-Finding Techniques for Visual Impaired Person in the Design of an Eye Centre, Jalingo, Taraba State."

Kindly assist him with relevant information.

With regards,

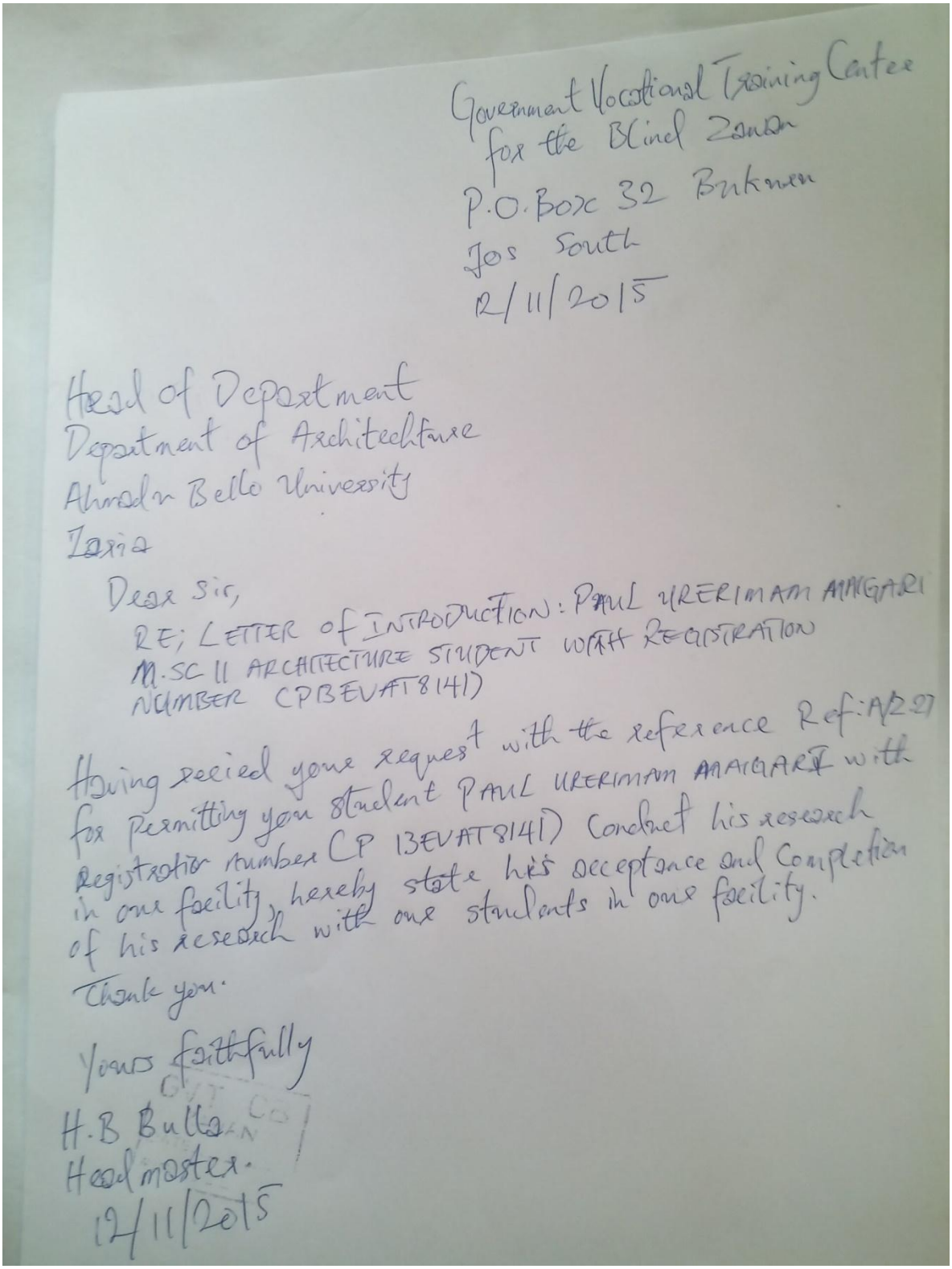
Yours faithfully,

Dr. M.D. Ahmed
HEAD OF DEPARTMENT

FACULTY OF ENVIRONMENTAL DESIGN
DEPARTMENT OF ARCHITECTURE
Head: Dr. M. D. Ahmed B.Sc (Hons) M.Sc(with Distinction)Arch PhD(ABU) mnia,msina

Telephone: +234-0803-7864-861
e-mail: architecture@abu.edu.ng

APPENDIX A3



Government Vocational Training Center
for the Blind Zonda
P.O. Box 32 Bukuru
Jos South
12/11/2015

Head of Department
Department of Architecture
Ahmadu Bello University
Zaria

Dear Sir,

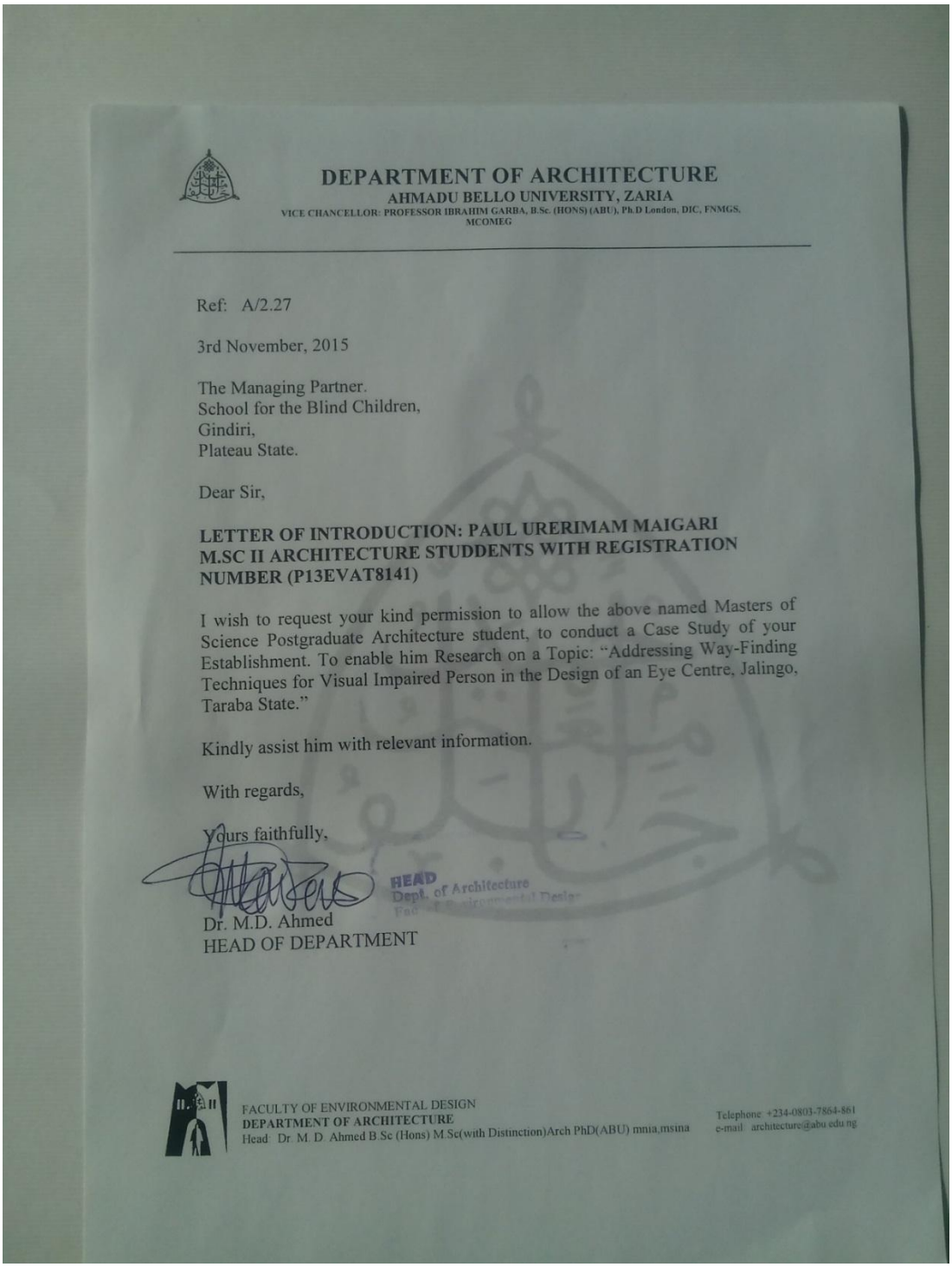
RE; LETTER of INTRODUCTION: PAUL UREIMAM AMAGARI
M.SC II ARCHITECTURE STUDENT WITH REGISTRATION
NUMBER CP13EVAT8141)

Having recied your request with the reference Ref:A/27 for permitting you student PAUL UREIMAM AMAGARI with Registration number CP 13EVAT8141) Conduct his research in our facility, hereby state his acceptance and Completion of his research with our students in our facility.

Thank you.

Yours faithfully
H.B Bulla
Headmaster.
12/11/2015

APPENDIX A4



DEPARTMENT OF ARCHITECTURE
AHMADU BELLO UNIVERSITY, ZARIA
VICE CHANCELLOR: PROFESSOR IBRAHIM GARBA, B.Sc. (HONS) (ABU), Ph.D London, DIC, FNMGS, MCOMEG

Ref: A/2.27

3rd November, 2015

The Managing Partner.
School for the Blind Children,
Gindiri,
Plateau State.

Dear Sir,

LETTER OF INTRODUCTION: PAUL URERIMAM MAIGARI M.SC II ARCHITECTURE STUDDENTS WITH REGISTRATION NUMBER (P13EVAT8141)

I wish to request your kind permission to allow the above named Masters of Science Postgraduate Architecture student, to conduct a Case Study of your Establishment. To enable him Research on a Topic: "Addressing Way-Finding Techniques for Visual Impaired Person in the Design of an Eye Centre, Jalingo, Taraba State."

Kindly assist him with relevant information.

With regards,

Yours faithfully,

HEAD
Dept. of Architecture

Dr. M.D. Ahmed
HEAD OF DEPARTMENT

FACULTY OF ENVIRONMENTAL DESIGN
DEPARTMENT OF ARCHITECTURE
Head Dr. M. D. Ahmed B.Sc (Hons) M.Sc(with Distinction)Arch PhD(ABU) mnia,msina

Telephone +234-0803-7864-861
e-mail architecture@abu.edu.ng

APPENDIX A2

DEPARTMENT OF ARCHITECTURE, FACULTY OF ENVIRONMENTAL DESIGN, AHMADU BELLO UNIVERSITY, ZARIA

This questionnaire is designed to get relevant information that will aid in **ADDRESSING WAY-FINDING TECHNIQUES FOR VISUAL IMPAIRED PERSON IN THE DESIGN FOR EYE CENTRE.**

All information provided will be use strictly confidential and will be used for academic purpose only.

Thank you.

Paul UrerimamMaigari.

SECTION A). BIO-DATA
Instruction: Please tick where appropriate [√]

a). gender: male [ ] female [ ]

b). Age range (in years): 15-19 [ ] 20-24 [ ] 25-29 [ ] 30-34 [ ] 35-39 [ ] 40-44 [ ] 45-49 [ ] 50-54 [ ] 55-59 [ ] 60 above [ ]

c). marital status: Married [ ] single [ ] Divorce [ ] widow [ ] widower [ ]

d). occupation: student [ ] business/petty trading [ ] civil servant [ ] professional [ ]

SECTION B). Way-finding

Instruction: Please tick where appropriate [√]

I. Categories of visual impairment

1. Do you see at close range?

Less than 5metre [ ] Less than 10metre [ ] Less than 15metre [ ] less than 20metre [ ]

2. How do you recognise person?

Colour [ ] Smell [ ] Sound [ ] Footsteps [ ]

II. Consciousness of your environment among the visual impairment

1. How do you know the place you are?

I stay there for long [ ] paint on the wall [ ] count the number of doors before entering [ ] someone's help [ ]

2. How do you consciously know your surrounding?

Somebody tells me [ ] my normal place of abode [ ] someone lead me there [ ] particular sound in that place [ ] particular feature you touch in that place [ ]

3. How do you know the space you are in?

Someone tells me [ ] I notice a peculiar feature [ ] sense of touch [ ] sense of colour [ ] equipment in the space [ ]

4. What are the techniques you employ to discover your immediate surrounding?

Sound [ ] Use of sense organ [ ] sense of smell [ ] monumental features [ ] Things in the environment [ ]

5. To what extent do you know your surrounding?

well [ ] very well [ ] none [ ] not sure [ ]

6. How do you notice any diversion of road in your surrounding?

Use of sticks [ ] different sound [ ] someone tells you [ ] someone will you lead you first [ ]

III. Way-finding techniques approach use by visually impaired to walk round

1. What are the techniques, you employ to manoeuvre your ways?

Help by someone [ ] Use of sticks [ ] use of monumental features [ ] sound in the place you are going [ ]

2. How do you move in a room space?

I follow straight path [ ] I hold a stick[ ] I hold handrail [ ] I touch equipment in the space [ ] I'm being help by another person [ ]

3. What are the techniques you use to search certain things in your space or offices?

Use of common sense [ ] help from visual abled person [ ] touching a leading walls [ ] use sticks [ ] mastering your immediate environment [ ]

4. How often do you miss your destination?

None [ ] not sure [ ] Sure [ ] always [ ]

5. How long will it take you to notice change in level in either your house or office? someone tells me [ ] I use sticks [ ] sound [ ] sense of touch [ ]

6. How do you notice change in level?

Use of sticks [ ] I have mastered the environment [ ] someone's' help [ ] handrail [ ]

7. How do you differentiate spaces (e.g.) toilet, bedroom, office and classroom?

Someone must tell me first [ ] sense of smell [ ] mastering and step counting [ ] colour of the space [ ]

8. Do you understand any place at first visit?

No [ ] not sure [ ] sure [ ] very sure [ ]

Please tick [√] the appropriate option that best represents your opinion about the statements.

Key: Strongly Agree **(SA)** Agree **(A)** Undecided **(U)** Disagree **(D)** Strongly Disagree **(SD**) **SECTION D): Effects of the landscape Environment on visual impaired.**

STATEMENT	SA	A	U	D	SD
1. The location of hostel and other facility makes visual impaired vulnerable to falling.					
2. Adequate facilities like walkways/kerbs help in preventing series of accident and stumbling.					
3. The use of walls will aide in reduction of accident.					
4. The presence of cluster common facilities/areas (Day rooms, Religious facilities) will reduce rate of falling.					
5. Both the interior/exterior wall paints will help in way-finding within the facility.					
6. The distance between facilities encourages you to master and navigate the entire area and understand large place.					
7. Landscape elements such as shrubs and hedges encourage your navigation in facilities.					
8. The use of handrail will ease your navigations in the facility.					
9. The use of handrails will reduce accident within the facility.					
10. The exterior wall paint of the facilities/buildings is pleasing to visual impaired.					

APPENDIX A3

CHECKLIST FOR ASSESSMENT OF CASE STUDIES

Name of Institution: _____

WAYFINDING PRINCIPLE	ASPECTS	CLASSIFICATION	COMMENTS
Creating an identity at each locations, different from all others	Monument/plant	i. Tree planted ii. Hedges planted iii. Status iv. pavement	
	Building form	i. Open ii. Enclosed (Corridors, Lobbies, Stairs)	
	Architectural character	i. Materials used ii. Building aesthetics iii. Appearance (Exterior & Interior)	
Use landmarks to provide orientation cues and memorable locations.	Building quality	i. Building form ii. Common facilities	
	Monuments	i. Natural ii. artificial iii. semi-natural	
Create well-structured path	Pavement	i. Landscape ii. Activity areas	
	Site Organization	i. Facilities location ii. Setbacks	
Create regions of differing visual character	Use colours	i. Type ii. Nature	
	Straight walls	i. Sand Crete ii. mode iii. use hedges	

Don't give the use too many choice in navigation	roads	iv. v. vi.	with handrail paved use sticks
	Pave area	i. ii. iii.	traditional modern semi modern
Use survey views (give navigators a vista or map)	Access road	i. ii.	narrow path wide road
Provide signs at decision points help way-finding decisions	Signage at interval	i. ii.	directional arrow sign
Use sight lines to show what's ahead	signage	i. ii.	Direction Warning signals
	arrow	i.	symbols

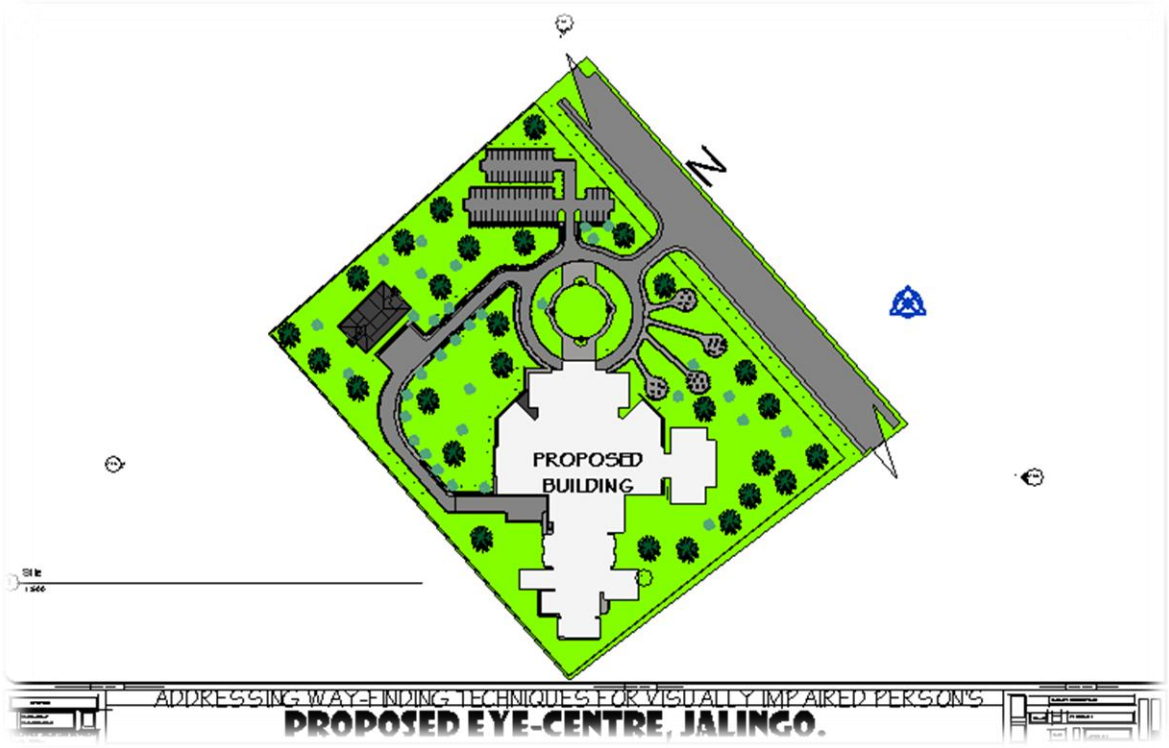
APPENDIX A4

INTERVIEW GUIDE FOR THE KEY INFORMANTS

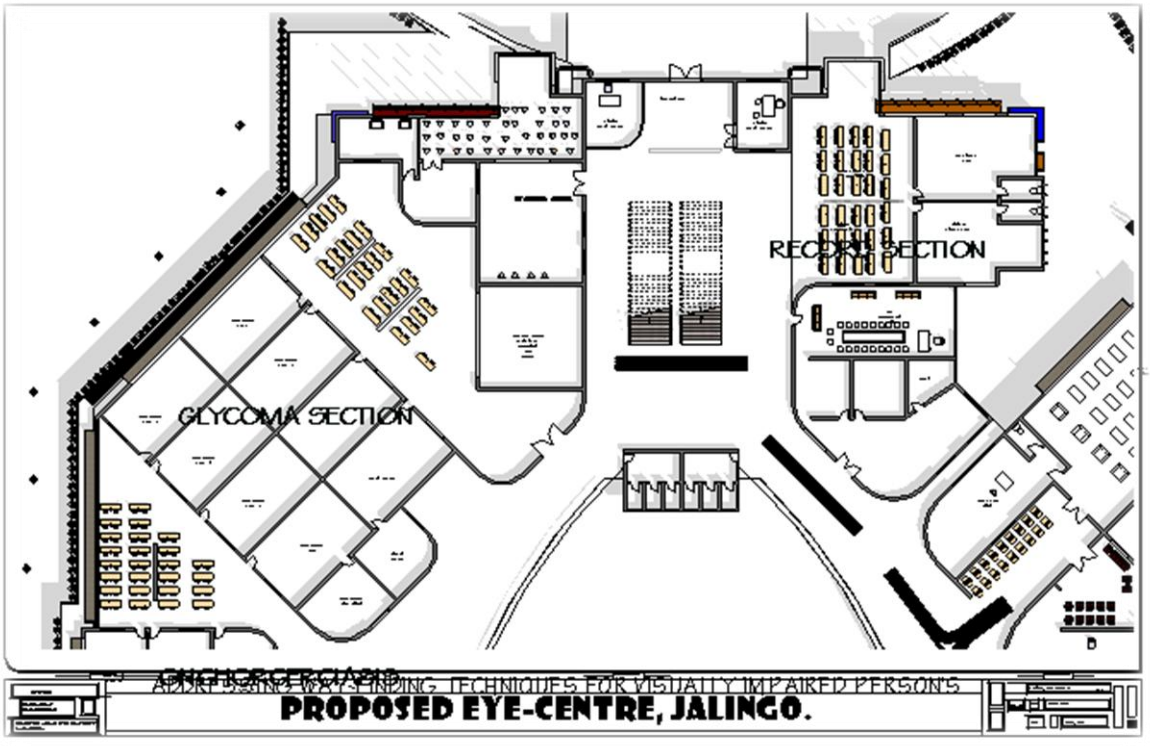
Name of Institution: _____

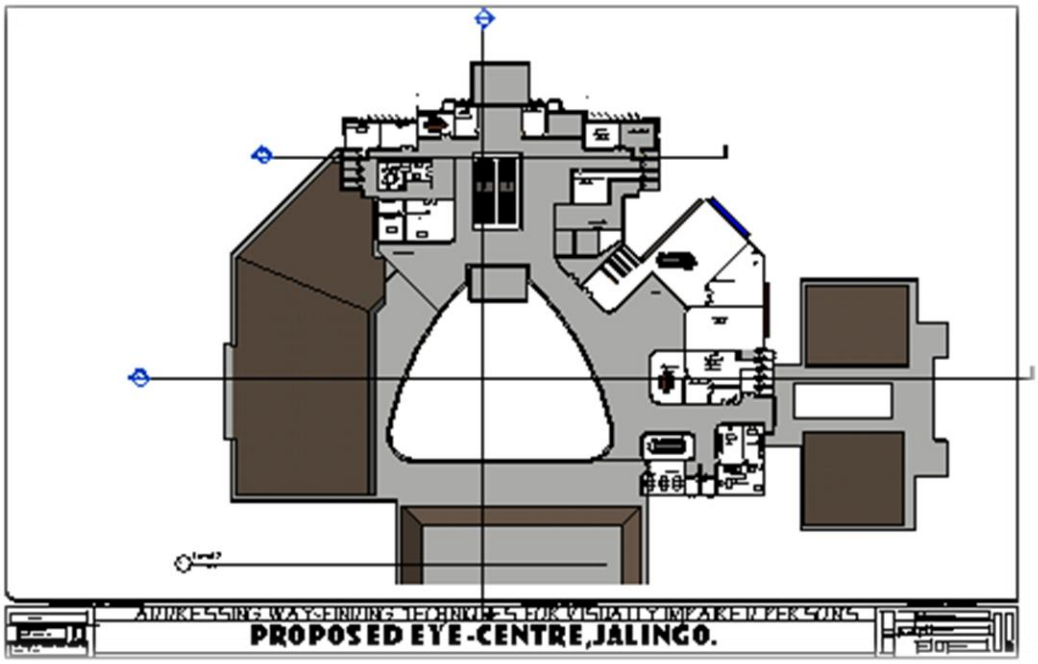
1. How do you think, better environment will be made to allow visual impaired person move in a space without being led by anybody?
2. How in your opinion do you think building element will be constructed to guide the movement and understanding of a space by visual impaired person?
3. How can a space be provided in other to avoid missing roads, falling down of visual impaired person?
4. In what way will architectural design prevent falling down of visual impaired?
5. How does site planning help in controlling visual impaired to move around a facility?
6. What effect does vegetation have in your buildings?

APENDIX A5



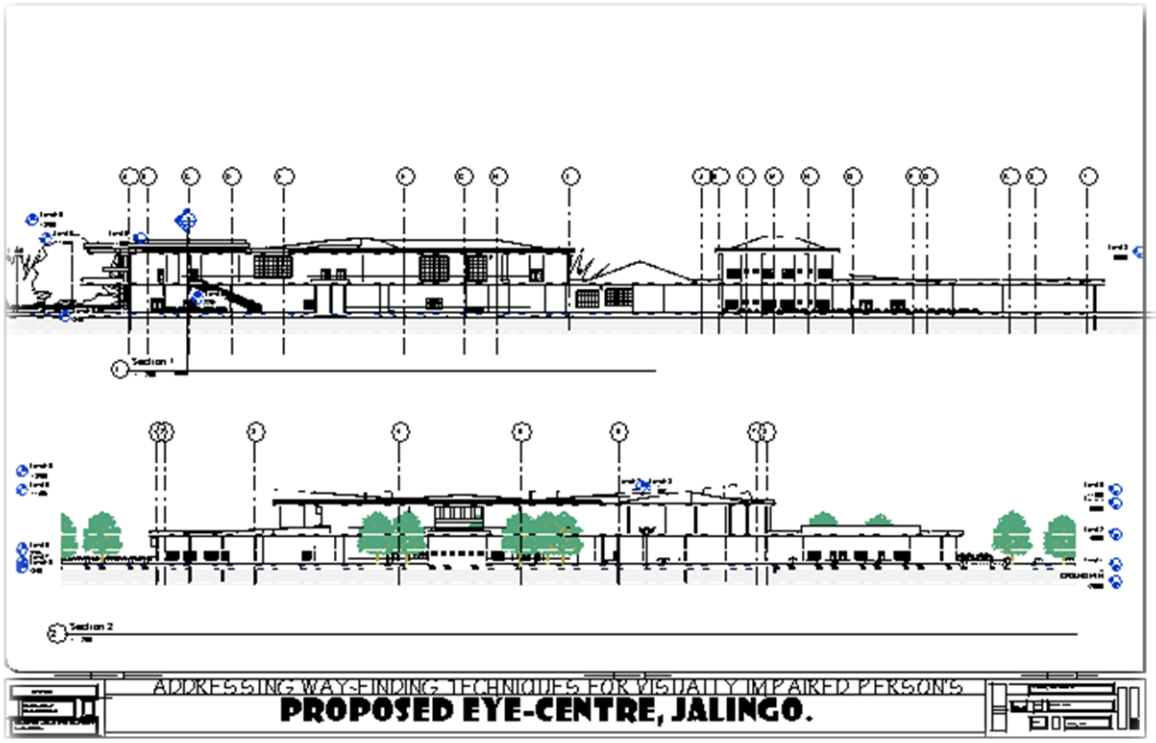
SITE PLAN OF THE PROPOSED EYE CENTRE JALINGO




ADDRESSING WAYFINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSONS
PROPOSED EYE-CENTRE, JALINGO.


North
East
ADDRESSING WAYFINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSON'S
PROPOSED EYE-CENTRE, JALINGO.


South
West
ADDRESSING WAY-FINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSON'S
PROPOSED EYE-CENTRE, JALINGO.


Section 1
Section 2
ADDRESSING WAY-FINDING TECHNIQUES FOR VISUALLY IMPAIRED PERSON'S
PROPOSED EYE-CENTRE, JALINGO.











