UNIVERSITY OF CAPE COAST

ROAD TRANSPORT INFRASTRUCTURE AND MOBILITY: VIEWS OF STUDENTS WITH PHYSICAL DISABILITY IN THE UNIVERSITY OF CAPE COAST

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ROAD TRANSPORT INFRASTRUCTURE AND MOBILITY: VIEWS OF STUDENTS WITH PHYSICAL DISABILITY IN THE UNIVERSITY OF CAPE COAST

BY

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DECLARATION

Candidate's Declaration

I hereby declare that this thesis is the result of my own original research and that no part of it has been presented for another degree in this university or elsewhere.

Candidate's Signature: ..... Date: .....

Name: Odame Kwame Prince

Supervisors' Declaration

We hereby declare that the preparation and presentation of the thesis were supervised in accordance with the guidelines on supervision of thesis laid down by the University of Cape Coast.

Principal Supervisor's Name: Prof. Albert M. Abane

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ABSTRACT

Though the Persons of Disability Act 715 calls for the provision of an accessible environment, attention on the mobility needs of commuters with disability has focused on persons with disability access to public buildings like library without paying attention to the walking environment connecting the homes of commuters to these public facilities. This study was carried out to examine the road transport infrastructure and mobility needs of students with physical disability in UCC. Specifically, the study sought to assess the extent of physical barriers that impede the movement of students with physical disability, determine the extent of usage of university shuttles by students with physical disability and examine the roles of stakeholders in providing accessible facilities. A sample of 28 visually impaired, 1 wheelchair user and 3 key stakeholders were engaged in the study. The visually impaired were selected by the use of snowballing and the rest were purposively selected. The results revealed that, the dominant passenger facility on campus was the sidewalk but these sidewalks were saddled with path obstructing objects such as potholes and electric poles. When it comes to crossing aids, none of the traffic lights on campus was augmented with audible transmitters to aid the visually impaired. With reference to the passenger environment, the absence of a documented policy to offer free ridership to these students provided the platform for drivers of privately owned shuttles to deny these students from enjoying free shuttles services. The study recommends documentation and enforcement of the free shuttle services for students with disability as well as the modification of the existing pedestrian and passenger facility.

KEY WORDS

Accessibility

Auditing scheme

Persons with disability act (715)

Road infrastructure

Universal mobility index

Visually impaired

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Finally, I would also want to thank my participant for their time and contribution towards this study.

DEDICATION

To all persons with physical disability in Ghana.

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LIST OF ACRONYMS

ADA	Americans with Disability Act
CASFORD	Casely Hayford Hall
CEPAL	Economic Commission for Latin America and the Caribbean
DDA	Disability Discrimination Act
DFID	Department for International Development
ECTM	European Conference of Transport Ministers
FELT	Faculty Education Lecturer Theatre
GPRTU	Ghana Private Road Transport Union
GDP	Gross Domestic Product
IDEA	Individuals with Disabilities Education Act
ISO	International Standards Organisation
MiDA	Millennium Development Account
NMT	Non-Motorised Transport
PWD	Persons with disability
SRC	Students' Representative Council
TRL	Transport Research Limited
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
UK	United Kingdom
US	United States of America
WHO	World Health Organization

CHAPTER ONE

INTRODUCTION

Background to the study

Access and mobility are fundamental human activities which cannot be compromised. The need to move has informed people's decision to migrate from one point to the other in search of economic resources, arable lands and other valuables. These movements may occur among individuals or large groups as in the case of an exodus. Before the advent of automobiles in the 17th century (Leonard, 2011), indigenous people had improvised their own means of transportation, dominant among these means being walking, push carts, animal driven carts and the use of animals like horses, donkeys and camels.

As population growth increased over time, the need for a more efficient and improved means of transportation emerged and this gave rise to the invention of the automobile in the eighteenth (18th) century by Nicholas Joseph (Leonard, 2011). These automobiles were powered by steam, coal or gasoline and could not carry many people. Their invention partly bridged the time-distance gap. Reducing the time-distance gap offered the opportunities for more people to explore places far and near, discover new things and places as well as expand the territory of their nations (McLuban, 1972; Simon, 1996).

The advancement in transport innovation did not only end with the improvement in vehicles but saw an overall improvement in transport infrastructure and services. This has given rise to construction of better transport network and also seen the emergence of specialization of operations in different areas within the transport system (Leonard, 2011). The planning, designing and implementation of these innovations are meant to be at the disposal of all transport users yet some road users do not get to enjoy these services as much as others. For the purpose of this thesis, the road transport infrastructure will be the main focus. Transport infrastructure refers to transport services, operations and facilities that comes together to facilitate mobility (Adjei, 2013)

The Collins dictionary (2015) defines a road user as anyone who uses a road, such as a pedestrian, cyclist or motorist. A section of these identified users are classified as vulnerable users and this largely constitutes the aged, persons with disability and children. This write up will consider persons with disability as the subject for discussion. Disability can take any form in the human, this can either be physical disability, where there is the inability of the use of limbs and other parts of the body; sensory disability, where there is a loss in the use of the senses like hearing or visual impairment; or mental disability, which has to do with defects of the brain (Adjei, 2013).

World recognition of the need to integrate persons with disability started as far back as 1981 which was climaxed with the celebration of the International Year of Disabled Persons by the United Nations. To follow up, the General Assembly of the United Nations adopted the World Programme of Action concerning disabled

persons which centred on three discrete areas namely: prevention, rehabilitation and equalization of opportunities for all. In a broad sense, implementation would entail long-term strategies integrated into national policies for socio-economic development, preventive activities that would include development and use of technology for the prevention of disabilities, and legislation eliminating discrimination regarding access to facilities, social security, education and employment (United Nations, 1981; UNHABITAT, 2013).

Although the 1981 declaration brought the plight of persons with disability to the limelight, focus on the declaration was based on the prevention and integration into socio-economic development without discussing explicitly issues of mobility as a tool to attain socio-economic development. Non-compliance with the above-mentioned declaration resulted in increasing level of segregation among persons with disability which was typical in developing and less developed countries. To this effect, the United Nations (1993) established Standard Rules on the Equalizations of Opportunities for Persons with Disabilities which was adopted at its General Meeting in December 1993 (United Nations , 2013).

The standard rules placed emphasis on equalizing opportunities under four preconditions and eight targets. The preconditions include elements like awareness raising on the need to give equal opportunities to persons with disability (PWD), medical care, rehabilitation and supportive services (United Nations, 1993). The targets on the other hand include equal access to school, employment, income maintenance and security, religion, culture as well as recreation and sports.

Although this rule sought to correct the former defect, it failed to put disability at the centre of developmental processes.

The inception of the Millennium Development Goals (MDG) in 2000 by the United Nations outlined eight goals which did not explicitly address the plight of persons with disabilities and transportation needs although these issues were inherent in the eight goals. None of the Goals or its related targets and indicators made provision for persons with disability. To this effect, a special convocation on the attainment of these goals as well as other international treaties for persons with disabilities was organised in September 2013 (United Nations , 2013). The sole purpose of this meeting was to provide guidance to the international community on ensuring accessibility and inclusion of persons with disabilities in all aspects of development efforts. The findings of this meeting revealed a wide gap between policy and practices on the ground and called for the removal of existing barriers to disability inclusion in development processes.

Available data on both developed and developing countries in terms of demographics raises issues of concern. According to the United Nations, prevailing demographics show that about 10 percent of the world's population has a disability. Secondly, about 80 percent of the world's 500 million disabled people live in developing countries and lastly, one third of older people have a disability and in some countries as many as two thirds of disabled people are also elderly. In reviewing these places on a continental scale, The European Union is said to have about 15.7% of persons living with disability and this translates into one in six persons. This figure excludes persons above 65 years who would qualify as aged.

Individual nations like Finland (32.2%), the UK (27.2%) and Netherland (25.4%) are the three leading nations with the highest rate of the prevalence of disability in the European Nation (Scott, 2010). Within the same year, the World report on disability indicated that, Africa had a disability prevalence rate of 16.7%, with South Africa reporting a rate of 7.5% compared to Ghana's 3% (South Africa Statistics, 2010; GSS, 2012).

Recognising the need to integrate persons with disability in planning and provision of transportation needs for all road users, some Western countries had taken the lead by drafting policies to address these challenges. For instance, the United States took the lead with the Rehabilitation Act of 1973 which was implemented in 1979. This was the first U.S Federal regulation regarding accessibility and mobility. In 1990, the Americans with Disabilities Act (ADA) made accessible and usable transportation a qualified civil right in the USA. The ADA is unique, in that, it covers public and private transportation providers and services in all modes, regardless of funding sources. The Federal Transit Administration (a regulatory body) has become active in complaint investigation and compliance reviews related to the ADA.

In 1979, Sweden passed legislation mandating that public transport be adapted, over a 10- year period, to the needs of disabled people. This legislation led to a holistic approach, with provision for automobile subsidies and accessible urban and intercity transport services. This regulation defined adapted public transport for all persons with disability in general but the needs of people with wheelchair was

not explicitly addressed in this provision (European Conference of Transport Ministers, 1991).

Many developed countries now have or are moving toward legislation, regulations, standards or codes of practice that require accessible transportation with countries like Japan taking the lead. Very little literature was found with regards to implementing polices that sought to address the needs of persons with disability when it comes to accessibility and mobility for countries in Africa. In Ghana, the needs of the persons with disability is catered for by the Persons with disability Act (715) but unlike the ADA (1990), Ghana's policy fails to provide a detailed and systematic approach on how the mobility needs of persons with disability should be addressed. For instance, section 29 of the policy requires all transport operators to include the persons with disability when planning and operating a transport services. With a legal policy like this act, transport operators fail to provide exclusive facilities like priority seats, designated areas and even boarding platforms. For the road environment, the ease of mobility is largely limited to the provision of side amidst the absence of curb cuts and path obstruction objects. These conditions make it difficult for commuters with disability to enjoy free movement as compared to person without disability (Addo, 2012).

Statement of the problem

In accordance with the Persons with Disability Act, 2006 Act 715, all persons living with disability in Ghana are to enjoy the same rights as persons without any form of disability. These rights range from health care and employment opportunities to transportation and other miscellaneous rights.

With respect to the above-mentioned areas, certain social interventions have been earmarked to meet the needs of persons with disability in Ghana. In the health sector for instance, section 30 of Act 715 requires the Ministry of Health to formulate health policies that would provide free general and specialist medical care for the poor including all persons living with a disability in Ghana (Naami, 2009; Slikker, 2009). To hasten health care delivery among this group, health care workers and the Ministry of Health made a regulation to exclude persons with disability from joining queues when they visit any health care facility.

When it comes to the transport needs of persons with disability, very little can be observed. As indicated by section 23 to 30 of the Persons with Disability Act, both pedestrian and passenger facilities should make room for facilities like low floor buses, boarding platform, reservation of seats in commercial vehicles, broader sidewalk with higher curbs and curb cuts as well as the complete absence of path obstruction objects on sidewalks.

In reality, road transport facilities in Ghana and the University of Cape Coast in particular seem to be far from meeting the requirements of both the Persons with Disability Act (2006) and the UNDP (2010) standards since the pedestrian facility in particular does not contain the needed accessories to minimise mobility

constrains encountered by commuters with disability. In the University of Cape Coast, the most dominant facility is the sidewalk which is certainly not enough to ensure the autonomy of disabled travellers on campus. The existing sidewalks are saddled with uneven surfaces, path obstruction and discontinuity in sidewalks which force wheelchairs user to completely abandon the sidewalk and compete for space with the vehicles on the streets on campus. For the visually impaired, the dislodging of bricks from the sidewalks forces them to resort to the road at certain points in their trip. For the safety of travellers with disability, crossing points are very important and though traffic lights have been installed on major crossing points, the safety of disabled travellers is not guaranteed since they still reply on non-disabled students for safe crossing.

For the passenger environment, the needs of students with disability has been catered for by the University of Cape Coast to some extent. This is only in reference to the provision of free shuttle services and even with that, some drivers of privately owned shuttles deny these students from enjoying this service. Other supportive assistance offered to students with disability has boarded on flexible admission requirement, provision of accommodation facilities throughout their stay on campus and the provision of a dedicated resource centre for students with visual impairment.

Academic attention on disability and transportation has been shifted from disabled travellers access and usage of the pedestrians and passengers' facility to their access to public facilities like schools, hospitals and residential places. Emphasis on access to public facilities raises concern about University's

commitment in creating an accessible walking environment that connects these students from their respective places to these facilities. The absence of an responsive walking environment results in modal mix which endangers students with disability on campus. (see Addo, 2014, Asante, 2015 and Mantey, 2014).

Taking the studies of the above cited authors into consideration and studies on the transport sector of Ghana, the paucity of literature when it comes to the usage of transport infrastructure and services by persons with physical disability is evident. The situation is even worse in tertiary institutions in the country including the University of Cape Coast. This informed the decision to undertake a research to seek answers to essential questions such as the following:

1. What are the physical pedestrian barriers that impede the movement of students with physical disability in the University of Cape Coast?
2. What is the extent of usage of University shuttles by students with disability on UCC campus?
3. What is the role of stakeholders in the provision of accessible transport facilities to students with disability in University of Cape Coast?

Objectives of the study

The main objective was to assess the transport infrastructure and mobility needs of students with physical disability in the University of Cape Coast.

Specifically, the study sought to;

1. Assess the extent of physical barriers that impede the movement of students with physical disability in the University of Cape Coast.

2. Determine the extent of usage of University shuttles by students with physical disability; and
3. Assess the role of stakeholders in the provision of accessible transport facilities for students with disability in the University of Cape Coast.

Significance of the study

It is expected that this study would contribute to academic research by expanding existing knowledge on the plight of persons with disability and their usage of transport infrastructure and services in Ghana. Furthermore, it is hoped that decision makers would use the results of this study to improve the planning, designing and implementation of transport services when it comes to meeting the needs of persons with disability. The findings of this research may also serve as the basis for future research into disability and transport studies.

Delimitation of the study

This study was limited to the transport infrastructure and mobility needs of students with disability in the University of Cape Coast. Specifically, the study aims to assess the extent of physical barriers that impede the movement of students with physical disability, determine the extent of usage of University shuttles by students with physical disability and assess the role of stakeholders in the provision of accessible transport facilities for students with disability in the University of Cape Coast.

Organisation of the study

The study consists of five (5) chapters with the first covering the background to the study, statement of the problem, objectives, research questions, and significance of the study.

The second chapter covers the review of relevant literature. This chapter entails a content analysis of the constitutional provision of disability Act in Ghana as against other nations, experiences of persons with disability in their usage of transport services and infrastructure. The chapter also reviews literature on the impact of the barriers on the disabled commuters plan and modal choice. Both empirical and theoretical works that relate to the study are reviewed.

Chapter three describes the research methodology including sources of data, sampling procedure, the research design, methods of data collection, analysis of the data a description of the study area.

The fourth chapter presents the data analysis and interpretation of the results. The discussions under this chapter relate to the literature reviewed in the study. The discussions are structured to address the objectives and conceptual framework of the study.

Chapter five which is the last chapter of the study focuses on the summary of the study, conclusions, theoretical implication as well as recommendations and policy implication. Following the conclusion drawn, some recommendations are proposed.

CHAPTER TWO

LITERATURE REVIEW

Introduction

This chapter reviews literature on concepts and definitions of disability as postulated by scholars in disciplines like medicine, philosophy, and sociology. The review focuses on two contrasting themes, namely the social and medical model of disability.

Definition of disability

World Health Organisation (2001) states that disability is the barriers society put in place to exclude the physically impaired from total participation. It is similarly defined as the barriers that restrict an individual from taking part in life situations. The Department for International Development (DFID, 2004) adds up to the definition by considering disability as both a social and a health issue where an individual's inability to partake in certain activities in society is determined by the person's physical, intellectual or mental condition. This definition is endorsed by Addo (2014) when he simply explained disability as a loss of some part of the body or health-related issue.

From the definitions above, one can see disability revolving around two central themes which explain the real causes of disability, namely Medical Model and the Social Model of disability.

Through the medical model, disability is understood as an individual problem where disability is defined by the physical or medical condition of the individual. If somebody has a visual impairment, mobility or hearing impairment, for example, their inability to see, walk or hear is understood as their disability. The medical model is also sometimes known as the 'personal tragedy model' because it regards the difficulties that people with impairments experience as being caused by the way in which their bodies are shaped and experienced. By the medical model, disability can be grouped into three namely: functional disability which includes the loss of a limb or an arm; sensory disability involves the loss of any sense organ like the eye, ear, nose, skin and the tongue; and cognitive disability depicts any intellectual impairment such as persons with stroke, autism and down syndrome (IDEA, 2012).

In defining disability by the medical approach, policy-makers and planners may identify persons with disability by activities they cannot do hence they tend to concentrate their efforts on 'compensating' people with impairments for what is 'wrong' with their bodies. Under this model it is thus easy for people with disabilities to be viewed as weak and defective, needy and dependent (since they are assumed to require the aid of medical professionals), and generally incapable of getting good jobs, living on their own or participating fully in society. The desired solution to these problems is often the cure or rehabilitation of the

individual, in order to fix the "defect" so that he or she can become closer to "normal." (Carson, 2009)

The medical model of disability has been criticized by some scholars (Oliver, 1990; Lang, 2001; Groce, 2004, & Gregorius, 2014) who offered the following reasons. In the first place, SOSA (2010) revealed that, the medical model has led to their low self-esteem, undeveloped life skills, poor education and consequent high unemployment levels especially when one is easily deemed incapable when he or she fails to undertake activities like the mere abled. Identification by the medical model is considered to be a factor that results in the breaking of natural relationships with their families, communities and society since it is likely to be the basis of an unintended social degradation of disabled people which could bring the feeling of pity on disabled persons. Besides the feeling of low self-esteem, the medical model ignores the roles of society in creating environment that impairs the movement of persons with disability. Such an omission solely attributes mobility challenges to deficit in human parts without considering society as an oppressor to mobility (Dubois & Trani, 2009). Also, the definition and context in which the word 'normal' is used is also contested and in the view of Gregorius (2014), the word 'normal' has no clear definition since blindness to the visually impaired can also be considered normal for persons with visual impairment.

Apart from defining disability from the Medical model, the Social model can also be used and this model has provided a more comprehensive approach to the issues of disability since it highlights the lived experiences of disabled persons

as they interact with society on the physical, economic, political and cultural levels. The social model considers disability as a social construct and it is therefore the poor physical environment and negative social attitudes that disabled people encounter which result in the systematic oppression, exclusion and discrimination against disabled people (Oliver, 1996; Lang, 2001; Shakespeare & Watson,2002).

In conceptualizing the social model of disability, the United Nations (2013) distinguished impairment from disability. In its view, impairment has to do with a loss in the physical or emotional components of a person. The definition largely looks at a loss in the human body part which coincides with the medical definition of disability. In this regard, the definition of disability in the medical model is rebranded as impairment in the social model. The social model then defines disability as the product of an interaction between a person and the environment and in this case the person may have an impairment or not. By this definition, the opposing factor is the characteristics of the physical or built environment and not the absence of a body part. This definition is adopted as the operational definition of disability for this thesis.

The social model of disability has gained more recognition since it reflects the experiences of the disabled group and to this effect, the removal of structural, economic, social, psychological and other forms of socially constructed barriers would promote participation or obstruct the activities or choice of persons with disability. Carson (2009) suggests anti-discrimination legislation like the America Disability Act (1990) and the Disability Discrimination Act (1995) of the UK since a legislative instrument of such nature would be specifically made to protect the

interest of disabled persons especially with reference to their interaction with society. According to Carson such policies and programmes of positive action have risen because it is now more widely recognised that disabled people are unnecessarily and unjustly restricted in or prevented from taking part in a whole range of social activities which non-disabled people access and take for granted.

In Ghana, the definition of disability is still not clear especially when the Ghana's Person with Disability Act of 2006 did not include a definition (Gregorius, 2014). With reference to prevalence, the recorded figure from the 2010 Housing and Population census estimated the disabled population to represent three percent of Ghana's population. In Gregorius view, this proportion is an underestimation of the actual figure. The Population and Housing Census defined disable persons as ''those who were unable to or were restricted in the performance of specific tasks/activities due to loss of function of some part of the body as a result of impairment or malformation'' (GSS, 2012). This definition clearly aligns itself with the medical approach where disability is identified by a deficit in the human body parts without considering the role to society. With respect to the prevalence, Gregorius cited the enumerators reluctance to ask of the presence of disabled persons because the enumerators did not want to create a discomforting situation for respondents' whiles collecting data for the Population and Housing Census.

Transport infrastructure and modal options for persons with disability

This section examines the modal options available to persons with disability and this would start with walking; the only form of mobility available to disabled

and older people in many developing countries. Transport infrastructure in this light include all transport services, operations and facilities that aids mobility of both people and freight. Every journey begins and ends on foot and in sub-Saharan Africa, walking accounts for 50 per cent of all daily trips for all ages (Frye, 2013). Persons with disability are most likely to walk long distances, despite their difficulty in doing so due to mobility and cost constraints. The UK Department for Transport in 2002 estimated the maximum walking distance for persons with disability and concluded that, wheelchair users had a maximum of about 150 metres of walk without rest while the maximum distance for mobility impaired persons with stick and without stick was 50m and 100 metres respectively. Factors such as gradients and weather conditions will also affect the distances people can walk.

In many developing and transitional countries, a combination of poor road surfaces and inexperienced drivers has also led to a significant increase in the numbers of younger pedestrians becoming disabled as a result of road accidents. In Cambodia, road accidents are the biggest single cause of disability in young people under 17 years of age. In addition to this Amoako-Sakyi (2010) and Porter (2013) estimates that 9 out of 14 accidents in Cape Coast results in serious injuries that could render pedestrians disabled.

Badly maintained streets, lack of traffic management, lack of physical segregation between pedestrians and cyclists or motorized vehicles all contribute to increased risk and, for older people, there is fear of falling or being knocked over. In response to these challenges, the 'Helsinki for All' project was established by the Helsinki City Board in 2002. Representatives of city offices, associations of

disabled and older people, government and other organisations are participating. The project has solved many problems that were identified at the start including the construction of a new type of kerb which works both for wheelchair users and visually impaired people as well as the construction of guidance and warning surfaces for visually impaired people that are robust enough to withstand the Finnish winter (Sito, 2005 & Capozzi,2011).

Japan is known to have been the first country to take steps to protect persons with disability who rely on walking as a primary mode of transportation. It is credited with the introduction of warning and guidance surfaces to help the visually impaired commuters without the assistance of a third party. This was achieved by constructing tactile surfaces and audible signals at road crossings which are intended to provide guidance and warning to total and partially sighted commuters when accessing the road and other transport terminals. This innovation was first done in 1967 (Martel, 2010). In some countries in Europe like Spain, Denmark, Finland and Germany there is also extensive adoption of this technology to assist persons with hearing and visual impairment move around towns. Worsfold and Chandler (2011) have identified another technology used in Birmingham which requires visually impaired commuters to carry a fob which transmits radio signals that is picked up by a speaker unit. The receivers then transmit a recorded audio message containing details of one's surroundings.

However, there is concern in many developed countries that the lack of international standards either for tactile surfaces or for audible warning signals can make it both difficult and potentially dangerous for blind people who travel abroad

(Frye, 2011; Fan & Huang, 2011). To add to this concern, the World Blind Union raised further attention to the gap in standard and also called for a swift action with regards to unionization of standards.

Another modal option for persons with disability is the use of wheelchairs and this is mainly used by commuters who have challenges with walking. The availability of wheelchairs is an indicator of basic levels of mobility, as such, one can infer a positive relationship between wheel chair usage and GDP of any nation since access to socio economic opportunities would not be hindered by mobility impairment in any way (Mckee, 2010).

Having identified the role of wheelchairs, Frye (2013) observed huge gap in usage of wheelchairs between developed and developing countries. She further stated that, while developed countries have a sales rate of about 30 units for every 10,000 populations, the rest of the world have about 2 to 3 wheelchairs for the same given population. This means that even the most basic outdoor mobility is beyond the reach of many in developing countries. For instance, in 2010 Tanzania had a population of about 41 million and disability population of about 3 million. Out of this number only 2000 had wheelchairs (Mckee, 2010). Further details from the United Nations indicate that, there are 20 million people in the world who need wheelchairs but do not have access to them. Less than one percent of the demand for wheelchairs in Africa is being met through local production (Winter & Winter , 2007).

It is vital that wheelchairs are appropriate for local conditions. In many developing countries, donated wheelchairs from developed countries, designed for

different terrains and without maintenance or spare parts, give limited benefits. There are a number of schemes both for local manufacture and supply of purpose built wheelchairs to suit local infrastructure as well as clinical needs, often administered via major international agencies such as USAID. These include Motivation (UK) and Whirlwind Wheelchair International (US), each supplying 12,000 to 15,000 wheelchairs a year.

Aside using the wheel chair, other common non-motorised means of transport available to persons with disability is the use of rickshaws, trishaws and pedicabs. These transport means are considered cheaper, more reliable, widely accessible and consumer friendly form of transport since their construction and maintenance can easily be done by local artisans. Aside being relatively cheap, they provide the best alternative for persons with disability who cannot walk for long distances since they provide a door-to-door service. In short, these modes serve as the best "taxi services for persons with disability" especially if par transit services are not well developed in an area (Cervero, 2000; Stouffer, 1940). Though rickshaws, trishaws and pedicabs have enormous advantages for persons with disability, their patronage has not been widely witnessed in most African countries like Ghana, Nigeria and South Africa as compared to Asian countries like India and Bangladesh.

The relatively poor nature or absence of footways as well as the risk of traffic injuries due to competition of road users for space are major impediments to users of these transport systems. Wheelchair users in particular are commonly seen in prime areas in both developing and developed countries but their movement is

often reliant on the assistance of people to overcome obstacles in the pedestrian environment. There is a universal lack of standards for basic accessible infrastructure such as minimum footway widths or ramp gradients hence any gradient steeper than 2.5 per cent is impossible for many manual wheelchair users (Venter, Sentinella, Rickert, Maunder, & Venkatesh, 2004). To this effect, one would wonder why some areas in Ghana have steeper slopes on ramps than others and wonder if the ramps with steeper slope were constructed with persons with disability in mind, although the purpose of these may be to check speeding of drivers on these roads. This means that, such an attempt to control the movement of one particular means of transport (vehicles) would end up disadvantaging other transport users like wheelchair users. It is important to understand that unless the disabled are able to use the streets of their cities with confidence, they will be limited in their ability to live independently.

The bus is the most common form of urban public transport in most parts of the world since, but more especially in developing countries. For instance, Eduam (2015) indicates that, 97 percent of passengers and freight traffic in Ghana occur on the road while marine, aviation and rail transport compete for the remaining three percent. Bacigalup and Silver (2007) of the American Public Transportation Association estimates road patronage at 60 percent due to stiff competition from the aviation sector. Current trends in making buses a more preferred means of transport for persons with disability has moved in the direction of replacing existing high level buses with low floor buses as one of the major steps to transform the accessibility of public transport.

The pace of the replacement has been faster in developed world than Africa. In the UK, a number of steps have been initiated to replace all high floor fleets. Frye (2013) estimated accessibility rate of buses in the UK ranged from 53 percent in 2004/2005 to 89 percent in 2009/2010. Aside the UK, other nations have also followed suit in this regard. In 2010, the city of Montevideo in Uruguay began a gradual process to replace its 1,500 buses with low-floor vehicles fitted with ramps to be phased over a period of time. Even before this, Singapore in 2006 had made an earlier plans of acquiring low floor wheelchair accessible buses (Gopinath & Kuang , 2012). In addition to replacing the high floor vehicles, CEPAL (2011), reports that these low floor buses were augmented with assistive technologies like hand rails, ramps, priority seats and designated areas for wheel chair users.

In the wake of all these innovations, some less developed countries on the other hand, have also resorted to simple and less costly innovations like raising boarding platforms or ramps on high floor buses as a short-term remedy to assist persons with disability in boarding buses as it is done in Projimo, Mexico (Heinicke-Motsch, 2003). The composition of these boarding platforms could either be wood, plastic or metal. In some cities with a legacy of old inaccessible vehicles, measures are being taken to help specific disability groups. The local administration in the city of Sofia in Bulgaria have collaborated with Association of the Visually Impaired to erect audible real-time information points at public transport stops (Frye, 2013).

Mobility and accessibility challenges for Persons with disability

Commuters desire to reach out to activities is sometimes encountered by constrains irrespective of the location and the level of disability of the commuter. These challenges in mobility can be attributed to deficiencies in the delivery of transport services and infrastructure like well paved pedestrian walkways with curb cuts and other assistive technologies for mobility impaired road users.

Porter (2009) sheds light on the influence of transport gap in rural Africa on girl child education. In her assessment, poor road infrastructure, costly and unreliable transport services contribute to the declining attendance rate of girls in Africa. The results of the sparsely occasion of school and poor road condition also increase the age of attending first school attendance since the nature and distance of the transport route may be too much of a burden for younger children to use.

For rural communities in Ghana, Malawi and South Africa, performance of domestic house chores has been skewed towards girls and these activities are undertaken in the morning or late afternoon. When the performance of these activities are combined with the challenges in rural mobility, girls' ability to compete competitively with boys in rural schools is hampered (Porter, 2007). The evidence of mobility constrains in rural areas on girls is seen in the decline in girls enrolment when it comes to progression to the secondary school level (Venosa, Faty, & Mwakasangula, 2010).

Urban dwellers on the other hand are not spared of mobility challenges. In Cape Coast for instance, Amoako-Sakyi & Owusu (2011) reports of the absence of pedestrian facility in places like Kotokuraba, Tantri and Adisadel. Reasons

attributed to the absence of pedestrian facility include the siting of houses close to the edge of roads. This has a historical precedence; housing facilities were located close to main transport routes. The effects of the absence of pedestrian facilities would be congestion since road users would be competing for the road. In the other parts of Cape Coast like the University of Cape Coast where pedestrian facilities are provided in some parts of the University, the condition of some of these facilities are so poor that disabled students find it a disincentive to use them. For instance, pedestrian facilities have very few curb cuts, poorly laid bricks on the walkway as well as the presence of electric poles in the walkways.

Road Environment

One desirable element for all persons is the need to maintain some level of autonomy in all activities. For persons with functional or mobility challenges, achieving such autonomy is difficult since the planning for public facilities and infrastructure seem to aid the mobility of able persons as compared to persons with disability. This situation is true in developing countries which are characterized by excessive demands on central government to provide all public facilities (DFID, 2004). The result of this pressure leads to uneven allocation of resources to the minority including persons with disability. This is particularly evident when the Federation of the Disabled in Ghana called for the boycott of the inauguration of the N1 highway because the construction of that facility did not meet their expectations (Mubarik, 2012).

In ensuring that the needs of the disabled community are met in the planning, design and construction of public facilities and transport infrastructure, some countries like America and the UK have spelt out specific guidelines (ADA, 1990). With reference to other countries like Ghana, Malawi and Nigeria, who may be cited as having a disability act just as America and the UK, yet do not have any specific guidance or standards when it comes to the planning, designing and construction of public transport facilities and buildings (Persons with Disability Act, 2006 & Banda, 2012).

Given their situation, international guidelines by the United Nations (International Best Practices in Accessible Public Transportation for Persons with Disabilities) may be used as the standard since they are signatories to the UN convention on the rights of persons with disability (UNDP, 2010). Other global standards include enhancing the mobility of disabled people: Guidelines for practitioners by the DFID (2004), ADA Standards for Transportation Facilities and the World Bank's Bus Rapid Transit Accessibility Guidelines (Rickert, 2006). All these standards have a lot of common features and focus on dimension and layout patterns of facilities.

With regards to Universal standards, this research work concentrates on disability facility on the road, in the vehicles and access to public facilities. Since the target of this study includes wheel chair users and the visually impaired, the facilities in this discussion will be skewed to identified groups though other groups of disability may also benefit from this facility. With regards to road conditions, this portion of the research work focuses on facilities like curb, curb cut, ramps,

pedestrian walkway, tactile signage and warning as well as the conditions and topography of the pedestrian facility.

Pedestrian walkway is one facility that regulates the movement of the pedestrians and without such a facility the competition for the road by both vehicles and other road users could result in congestion where the movement of one person obstructs the other. The outcome of congestion may lead to a high level of road accidents of which pedestrians constitute about 70 percent of victims (Amoah, 2012). In providing sidewalk, the DFID (2004) and Ferreira & Sanches (2006) suggested that, the sidewalk should be about 2000 millimetres in width since this width is big enough to allow two (2) wheel chair users to move side by side without obstructing each other. In areas of low and medium traffic volume, the DFID further recommends that, the width of pedestrian facilities should be 1500 millimetres since this would still give room for one-wheel chair user and another non-wheel chair user including the "able bodied road user", visually impaired and other disability groups. These measurements are same in other universal reports from the DFID (2004), revised America Disability Act (2010) and the World Bank's Bus Rapid Transit Accessibility Guidelines (Rickert, 2006). Aside this requirement, sidewalk should also have even surfaces, free from obstacles and should be straight with benches along the routes since "non-wheel chair" disable persons may not be in position to walk for long distances.

Aside having a wider surface area for mobility, another key element for the movement of the wheel chair users are the curb and the curb cut. Hoy (2003), defines the curb as the raised embracement of a road and this refers to the distance

between the surface of a road and the highest point of sidewalk. The height of the curb would assist the visually impaired to differentiate the sidewalk from the road since the sharp difference in height would be a suitable indicator for disabled commuters to tell which side of the road they are walking on. The recommended height for cubs should be between 130 millimetres and 160.millimetres (DFID, 2004). If disabled commuters would want to cross from one side of the walk way to the opposite, the curb cut becomes the best facilities to support such a movement.

DFID (2004) suggest that, curb cuts should be placed at points where one would have to transit from the road to the curb or vice versa. In measurement, the ADA (1990) recommends that, the design of a curb cut should also make provision for a landing space for the wheelchair users after the ramp and also make provision for flares (which comprises two ramps which are positioned at 90 degrees to the curb cuts). These flares aid the mobility of the wheel chair users if they choose to go left or right when approaching from the road. Universally, the slope of this slop should be gentle at 1:20 or 1: 15 maximum since such a gentle slope can easily propel the wheel chair user to join the side walk or move onto the road as he tries to cross the road. Other measurements include a ramp and flares length of 800 millimetres as well as the presence of a tactile signage that would aid the visually impaired to identify a point at which a change in slope might occur.

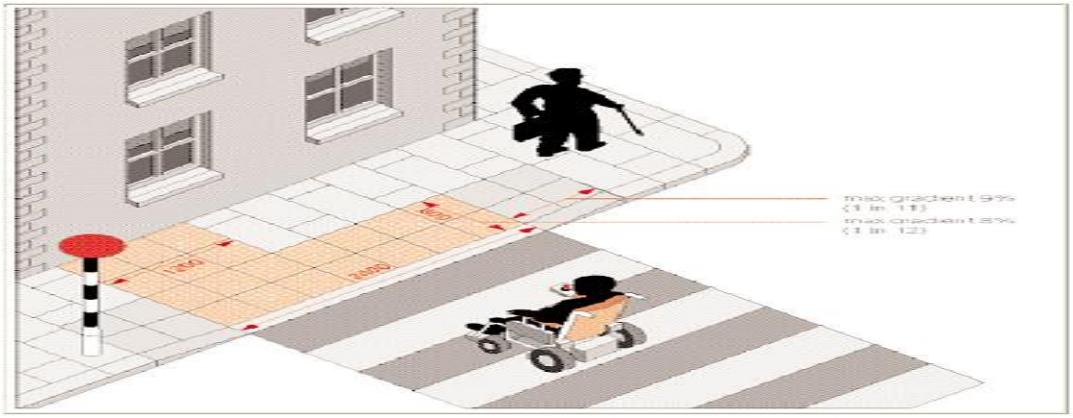


Figure 1: Accessible curbs cuts for wheelchair users.

Source: DFID, 2004

Another key facility for both wheel chair users and the visually impaired is the tactile signage and warning sign. These are assistive communication tools that provide detailed directions to ticketing, information on fare, bus schedule and guides the movement of the visually impaired. Just as the visually impaired relies on the Braille for information, the tactile signage and markings also acts as "braille" in the transport world. These may include the use of numbers, letters, pattern of elevation on the ground and pictogram. With reference to letters, numbers and pictograms, the DFID (2004) suggests that, these elements should be within 1 millimetre to 15 millimetres from the surface of the elements to which they are placed. The DFID further recommends that, these symbols should be placed at a height of 42 inches from the ground since it can easily be reached by most people. If the letters or symbols are just printed on the notice boards, visually impaired commuters will not be in a position to use them since these elements cannot be read with their fingers.

Aside placing the elements on the boards, tactile warnings are also displayed by creating a pattern on the ground which could be vertical, horizontal or nodes (dots). This could take the form of elevated square pattern of different intervals that would guide the movement of visually impaired in moving in a particular direction and this may usually be to ticketing booth, bus terminals or even exit the bus station. In view of Combrick (2012), the tactile surface has two main functions and these include the guiding path and warning of visually impaired of potential danger ahead. To this effect, tactile surfaces may be placed on the ramps of curb cuts and crossing points since it could warn disabled commuters of the danger ahead. The DFID (2004) further recommends that a tactile surface should have contesting colours like black and white or even black and yellow since these colours are easily identified by people with low vision. Figure 2 shows tactile surfaces and signage

Figure 2: Tactile signage and surfaces.

Source: Google pictures (2015).

Another key requirement on the road environment for disabled commuters is signage and its placement. Signage for disabled commuters comprises any medium which is used to transmit information and in this sense, signage could take the form of either audio or video. For the purpose of this discussion, this research work would be limited hard cards, boards, road signs, electric poles and may be extended to objects that may obstruct the movement of disabled persons. Irrespective of the format, all signs should be clear, concise, and accurate (UNDP, 2010). Clarity is expressed in terms of legible textual formation as displayed on the screen and in this light, it is always better to present text in smaller letters than capital letters. The size of the text should have a minimum font size of 14 when the signs are indicated on paper.

With reference to large bill boards, the signs should always be 1 percent of the distance at which these signs are viewed and the best fonts for this signage should be Arial, Times New Roman and San Serif. The ideal height of this signage should be about 2,100 millimetres and should also have contrasting colours that would easily be appreciated by persons with low vision. In cases where other pedestrians obstruct disabled commuters from seeing, these signs can be placed at higher altitude (Combrick, 2012). Irrespective of the dimension of these signage, best place for siting them should be on the curbs and not on the pedestrian walkways. However, observations from the University of Cape Coast reveal the siting of poles and road signs on pedestrian walkways which obstruct the movement of both disabled and none-disabled commuters.

Vehicular design

Vehicular designs reflect the accessories and design specifications that are factored in to the making of vehicles. Addo (2014), identified the inadequacy of the government to ensure the importation of disability friendly vehicles into the country and attribute this as one of the reasons why wheel chair users in particular seldom rely on public transport. For the purpose of this research work, vehicular design would be limited to floor distance of vehicles, hand rails, ramps, assistive technology in vehicles, priority seat or space and the provision of free or special incentive for disabled commuters.

The height of vehicles is one of the factors that have been identified by (Frye, 2011) as a major obstacle to the movement of the disabled commuters, particularly wheel chair users and the visually impaired. In ensuring an all-inclusive transport system, many countries have made provision for the purchase of low floor vehicles whose height is known to be about 230 millimetres from the ground (Khetarpal, 2011). King (1994) whose work was influenced by the ADA estimated the floor heights to be 320 millimetres and this measurement considered the curb as well. If there is a curb of about 150 millimetres, the actual climbing height would be less than the 230 millimetres as observed by Khetarpal.

Though this height is universally accepted, the UNDP (2010) reveals that, most developing countries still prefer the high floor vehicles due to their cheaper price and suitability for the rough roads. Addo (2014) commends the government of Ghana for its approach in replacing some of the high floor Metro Mass transit buses but also laments on its inability to replace all the buses as well as the

government's inability to provide incentives for members of the GPRTU to gradually replace their buses since the GPRTU control over 70-80 percent of commercial buses in Ghana (Abane, 2013). Figure 3 shows a low floor and high floor bus respectively

Figure 3: Low and high floor buses

Source: Google images, 2015

Aside the floor, one other complementary factor is the size of width of the entrance to the vehicle. The DFID (2004) identifies two main entrances: entrance to existing low floor vehicles; and entrance to an elevated vehicular floor. With respect to disabled commuters, the UNDP (2010) recommends that disability-friendly buses should have a clear entrance width of about 800 millimetres which should be free from protruding objects since such objects can narrow the entrance of the vehicle.

Irrespective of the width of the entrance, the ease of manoeuvring into the buses would be enhanced by the presence of ramps which could either be manually or electronically operated. UNDP (2010) identifies the relative high cost of

acquiring and maintaining the automated ramp. Owing to that, most of ramps used on buses are manually deployed by the drivers. To ease the movement, these ramps should be at an angle of 1:20 (5%) but a maximum of 1:12 (8%) would be accepted in special instances. The width of the ramp should correspond to the width of the entrance of the door and this should be about 800 millimetres (Hoy, 2003). Manually deployed ramp should also be augmented with a hand rail and this would benefit the visually impaired, wheel chair users and the aged since it will provide balance for them as they move into the buses. Observation from the University of Cape Coast shuttle terminals and some taxi station revealed the total absence of ramps at the stations. The absence of this facility impairs the movement of wheel chair users and makes it difficult for them to move from one place to the other.

Handrails should be attached to the entrance of the vehicle and extended all the way to the base of the ramp. In most cases, the ADA (1990) recommends that, handrails should even extend to priority seats or designated areas of disabled commuters. At best, the handle should be about 800 to 900 millimetres from the ground and should also be non-slippery with contrasting colours. The handrails should also be at most 50 millimetres apart and are more useful when the change in slope from the bus-stop to the entrance is steep. In the vehicles, these handrails should also be positioned close to the designated areas so that disabled commuters would not fall anytime the driver negotiates a turn. Though disabled persons are not many in the University of Cape Coast, the provision of such rails could aid non-disabled students who may be weak or sick.

Figure 4: Ramp and handrails.

Source: Google images, 2015

In synchronizing vehicular designs to the needs of the disabled commuters, city authorities and the states should ensure that, vehicles imported into the country have priority seats and designated areas for wheel chair users. These priority seats could take the form of reserved seats for disabled commuters other than wheel chair users and designated areas for wheel chair users. The position of these priority seats or areas are usually close to the entrance or directly behind the drivers' seats. The reason is to reduce disabled commuters time and distance for walking into and leaving the bus as well as allow them to easily reach out to the driver if need be (Oxley, 2002). These priority seats are usually the last to be occupied before the bus takes off and will only be offered to the "able bodied" travellers when no disabled commuter comes to board the vehicle. Venter et al (2002) has identified the weak enforcement of priority seats for disabled commuters as one of the reasons why disabled commuters seldom use public transport in India. Venter et al further claims that these seats become the platforms for drunkards and persons with

suspicious character and to this effect, some disabled travellers in India prefer to sit on seats that are reserved for the able bodied which can be discomforting.

The number of wheel chair space is often dictated by the level of demand but the ADA (1990) suggests that, the minimum wheel chair space should be two and all these areas should be fitted with a bell so that disabled commuters can communicate their desire to alight or draw the attention of the driver or the conductor. In all of the above cases, both priority seats and designated spaces should be clearly identified with well labelled signage. Figure 5 indicates a designated seat for both wheel chair users and the visually impaired.

With reference to Ghana, commercial vehicles make no provision when it comes to reserving space for wheelchair users since this would mean a reduction in the number of required seats and a subsequent reduction in expected revenue. The situation even worsens when no wheel chair user comes to board the vehicle. In such circumstances, drivers would have to bear the full cost of the space if no wheelchair user boards their vehicle. Although these spaces could be offered for passengers who wish to stand, these passengers are likely to resist such an offer if they would be made to pay the same fare as those seated.

Secondly, the high floor commercial vehicles also suggest drivers that would have to make provision for ramps and other complementary tools which would translate to higher operational cost. This implies that, disabled commuters would have to pay more for transport services since they receive special attention.

Figure 5: Designated space and priority seats.

Source: Google pictures, 2015.

The Ghanaian situation

Ghana's Disability Act 715 was passed after many efforts from Persons with Disabilities (PWD), NGO and other interest groups in 2006. It has 12 main objectives and its provisions are divided into eight sections including issues on education, employment, health care, transportation, laws against discriminatory actions and the use of derogatory names on persons with disability (Adjei, 2013).

On transportation, Section 23 to 30 of the Act provides road instruments that would be used to meet the mobility needs of persons with disability. For instance, section 23 of Act 715 covers the holistic integration of the mobility needs of travellers with disability. To accomplish this, the act recommends to the Transport and Local Government Ministry to consider travellers with disability in the planning, construction and operation of transport network in Ghana. However, while the builders code of 1988 prescribes an outline that governs the construction

of every building or edifice in Ghana, Act 715 fails to enumerate the specifics of section 23 to 30.

The other sections of the transport clause ranges from the importation of non-conventional vehicles to be used by some travellers with disability. According to the Act, such vehicles shall be exempted from the payment of import duties and other taxes associated with importation. In respect of this, the policy remains silent on who should sponsor the acquisition of these vehicles since a large proportion of persons with disability form part of both the rural and urban poor due to low employment opportunities for them. Section 26 further calls on all parking lots operators to demarcate a special parking spot for travellers with disability.

Again, section 29 calls on transport operators to reserve two seats in their vehicles for commuters with disability. This legislature requires transport operators to offer these two seats to non-disabled travellers only when the other seats are occupied and there are no travellers with disability to occupy these reserved seats. The realization of this provision is yet to be fully observed as visually impaired and other disabled groups find it difficult to identify these reserved seats as they are not labelled with pictograms. Also, transport operators are reluctant to reserve a designated spot for such persons (Adjei, 2013;Oliver Commey, 2001).

Road transport is pivotal to Ghana's economy, with some 97% of passengers and freight traffic using roads (Eduam, 2015). In spite of over 66,200 kilometres of road network, very little achievement can be mentioned when it comes to the provision of facilities for persons with disability who constitute about 3% of the population (Ghana Statistical Service, 2010).

It will be unrealistic to assume that the government is not aware of the plight of these persons especially when they are given annual budgetary allocation of 2% of the district assembly common fund of which they are not able to access all (JMK Consult, 2008). The amount is not the issue of interest here but the mere allocation of funds is enough to make a strong case for their existence. Providing funds to persons with disability is one way of addressing their needs, but another key need that seems to be neglected is the need for easy mobility especially in the provision of transport infrastructure and services.

To make the transport needs of commuters with disability known, the Federation of Disabled Persons attempted to take legal action against the Millennium Development Authority (MiDA) over what they termed as a deliberate disregard for their needs in the construction of the 14.1 kilometre Tetteh Quarshie-Mallam N1 highway. This legal action was set to put an injunction on the inauguration of the highway which was to be attended by a former and current head of state as well as other dignitaries from the US government. According to the Federation, MiDA did not factor in the needs of people with disabilities into the construction of the new road especially regarding crossing the highway. In the submission of the Federation, other highways like the Achimota-St John's- Pokuase route have two different overpasses which have been modified for people with disability and wondered why the N1 was constructed without one. In response to the agitation, the chairman of MiDA assured the group of his commitment to make the highway disability friendly, and three years down the line, the complains of the Federation are yet to be met (Addo, 2012).

Another event is recalled when the Ghanaian Chronicle reported of government commitment to fulfil the provisions of the Disability Act by ensuring that the construction of the roads in Tamale were made disability friendly (Jalulah, 2013). In siting the facilities, the Director of Department of Roads in the Bolgatanga Municipality mentioned the construction of footbridges and access ramps that would make room for the physically challenged to cross the road. He also said alarm systems would be installed to aid visually impaired persons to cross. When installed, the alarm system would generate distinct sound to alert other road users when visually impaired travellers are crossing such road but the manifestation of this promise was never realized.

By mere observation, the provision of disability friendly transport infrastructure and services in Ghana is limited to the provision of footbridges, traffic lights, curbs and segregation of road users in limited areas like the Legon road in Accra and a portion of the Tarkoradi -Tarkwa road.

In the main, very little is seen when it comes to the existence of disability friendly public transport services in the country. This includes services provided by the Ghana Private Road Transport Union (GPRTU), State Transport Cooperation (STC) and the Metro Mass Transit (MMT). A feature like grab handles is mostly seen in Metro Mass buses these features but are hardly seen in any of the GPRTU operated buses which constitute about 90% of commercial buses in Ghana (Abane,1990). While countries like Uruguay and Singapore have made attempts to provide low floor wheelchair accessible buses, such buses are yet to be seen in Ghana (Yobo, 2013).

Conceptual framework

The Universal Mobility Index (UMI) is a composite human development indicator that quantitatively measures disabled commuters access to all sections of the built environment. Unlike a clinical test where the assessment is done by the physiologist, the UMI requires the disabled commuters to enumerate, measure and prioritise the removal of barriers. In all, the UMI groups the barriers to mobility into 2 components namely; the built environment which refers to disabled commuters access to all physical buildings and transport systems. The second component is in line with engagement of disabled commuters in policy making regarding their mobility. Having identified these components, disable commuters were then required to score their access to these components on a Likert scale from very bad to very good which is index to a scale of 0 to 1 where a score towards 0 represents the least accessible environment and vice versa (Green & Jackson, 2011).

The Universal Mobility Index (UMI) was adopted as the conceptual framework for this study. This is a disability focused assessment which only relies on the views of the disabled community as its main source of information, though these views could be exaggerated. The framework was chosen because of its applicability to other forms of disability since it can easily be modified to fit a particular group of disability. Secondly the data needed to test this framework could easily be obtained through questionnaires or interviews.

In order to precisely reflect the variables of interest of the study in the adapted model, some modifications were done to the original framework. A third

(3rd) theme was introduced to reflect contribution of social factors to mobility constrains amongst persons with disability. This would largely look at people's attitude towards disabled commuters. Of course, these perceptions are shaped by culture, religion, and society at large. Under transport facilities, trains and trams were excluded from the adapted model since trains are not included in the study and trams on the other hand are not in existence in Ghana.

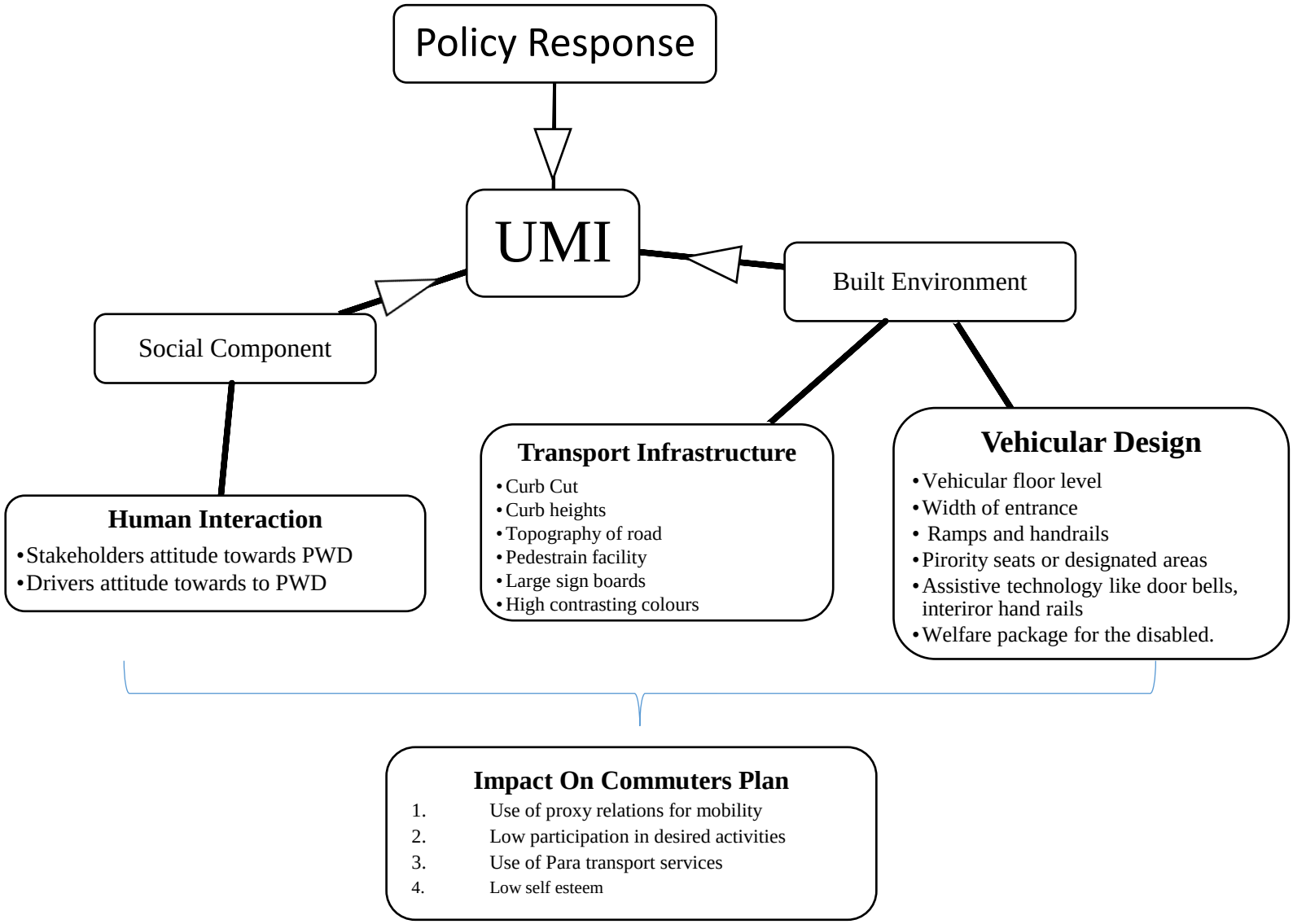
Under Vehicular standards, this theme shall concentrate on accessible vehicular designs and in this case, the element under review shall include the presence of low floor buses, hand rails on entrance, the presence of priority seats or designated areas as well as welfare packages for disable persons who use the University's buses. In this section, the standards of measuring accessible vehicles shall be the UNDP's (2010) review of international best practice for accessible public transport for the disable.

The independent variables for the study were: disability profile including age, sex, program of study and type of disability. The dependent variable for the study is lived experience of disabled commuters in the use of public transport facilities and infrastructure as well as participation in any policy making process. It is expected that the interaction of disabled commuters with public transport facilities will provide a good basis to call for an overhaul in the road transport sector and the design of public infrastructure that will address the needs of disabled commuters.

The strength of the model lies in its ability to reflect the plight of all disabled commuters as compared to other frameworks that centred on a particular group of

disability. Unlike the rational model where the assessment is done by therapist in a controlled environment, the Universal Mobility Index solely rely on disabled persons' experience as narrated by the disabled person himself or herself. This approach would afford the study to derive a more comprehensive and reliable data since the data could emanate from the subject in question. The adapted framework that corresponds to this write up is seen in the Figure 6.

The design of the framework made it easier to include omitted elements which are deemed relevant to the study and these include the contribution of social factors to the barriers of movement and the impact of these barriers on disabled commuters' plans. This final element simply looks at the outcome of these barriers on the life of disabled commuters and this includes the reliance on close relatives or friends for movement, limitations in disabled participation in desired activities, and the use of Para transport facilities, low self-esteem and the usage of public facilities at the off-peak periods.



Adapted from Green and Jackson (2011)

Figure 6: Conceptual framework

CHAPTER THREE

RESEARCH METHODS

Introduction

The method used to achieve the research objectives is described in this section. The study is focused on identifying the mobility needs and constrains among students with physical disability in the University of Cape Coast. Mobility is measured with reference to participants' assessment of their usage of the road environment, campus shuttle buses and the role of stakeholders in meeting the mobility needs of students with physical disability. Issues covered in this chapter range from research design and approach, target population, sample size and sampling procedure, research instrument, data collection and analysis to description of the study area.

Research design

Exploratory research design was adopted for this study since it provides opportunity to acquire new insights, discover new ideas as well as expand knowledge on new and existing phenomenon including the mobility needs and constrains of students with physical disability in the University of Cape Coast. In the views of Burns and Grove (2001) & Ozge (2010), this research design helps to clarify and define a phenomenon and can therefore be termed as a formative research since it provides a foundation on which other research designs can be developed.

By defining a problem, exploratory research design can be categorised into four main themes which reflect different approaches to which knowledge on the problem can be obtained (Creswell, 2012). These are experience surveys which require the researcher to elicit information from knowledgeable individual about a particular situation and in the case of assessing the lived experience of students with physical disability, this research design was deemed appropriate for the study. The other three categories of exploratory research design are case studies, pilot studies and secondary data analysis. Munhall (2001) opines that, the richness of the data obtained from experience surveys provides researchers with a better appreciation of respondent's situation which includes students' usage of available transport facilities and infrastructure in the University of Cape Coast.

The exploratory research design has been criticised on the basis of its inability to make generalisation on a large population. Exploratory research employs relatively small sample sizes which cannot be considered as representative of the population hence the difficulty of the researcher when it comes to generalization of the research findings (Wyr, 2012). In accounting for the challenge of generalization, Wyr attributed this to the absence of a rigorous structure when it comes to methods of data collection and analysis.

Research approach

In attaining the set objectives for this research, a mixed research approach was adopted since it afforded the researcher the opportunity to combine both qualitative and quantitative research approaches in a single study (Creswell & Plano, 2011). Creswell (2012) further cited the basic assumption

for adopting such research design and to him, a mixed research design is used when a researcher wants to attain a deeper understanding of the identified problem. In this case, the strength of one research methods complements the weakness of the other.

Though the use of both quantitative and qualitative research designs involves a substantial investment in time and cost, the relative advantages of combining both methods outweigh the identified constrains. The use of both enhances the degree of validity and reliability in the data since both methods would assist the researcher to cross check the data he collected from the field. To this effect, the result of a mixed method could be a convergence or contradictions of the result of both methods. In Bryman (2004) and Goknur's (2008) view, a mutual confirmation from both methods is an indication on a higher degree of validity since there is a major reduction in biasness, loss of information or incomplete information.

The qualitative data in this study was obtained by the use of an interview schedule for students with disability and the focused-on participant's lived experience in the use of pedestrian and passenger transport facilities on campus. Here participants shared their thoughts on how existing transport facilities on UCC campus impedes or facilitates their movement. For the stakeholders, qualitative data was also elicited from them and this was focused on their roles in the provision of an accessible transport infrastructure for students with physical disability. The quantitative data for this study was elicited by the use of an auditing scheme which allowed the required to collect data on the number, condition and presence of selected facilities on campus. The output of this data

allowed the provided the opportunity to identify discrepancies in calibration of some transport facilities and also complement the views of the participants.

In the midst of these advantages, Mantey (2014) and Clarke (2005) identified the different theoretical underpinnings of these methods as a major obstacle since known point of convergence between the two methods is not yet known. In his opinion, the different underpinnings would influence the kind of analysis a researcher would do hence the likelihood of not reducing a true reflection of the situation. Notwithstanding all these challenges, Bryman (2004) identifies the mixed methods as gaining popularity in research designs and this is primarily due to its ability to ensure a high degree of validity and reliability.

Description of the study area

Cape Coast is the capital of the Central Region and it is bounded on the south by the Gulf of Guinea, west by the Komenda-Edina-Ekuafo-Abrim (KEEA) Municipality, east by the Abura-Asebu-Kwaman Kese District and the north by the Twifo-Hemang Lower Denkyira District. The metropolis covers an area of about 122 square kilometres and has a population of 169,894 out of which 82,810 are males and 87,084 females (Ghana Statistical Service, 2012). It has a population density of 162 persons per square kilometre and the current population growth rate in the Metropolis is 2.0% which is less than the national annual growth rate of 2.2% (GSS, 2012). The ratio for the 1970, 1984, and the 2000 population census were 109:100, 100:100 and 99:100 respectively.

As the regional and administrative capital of the Central Region, Cape Coast and its environs experience more economic activities than other areas within the region. The absence of rail and air transport implies that, most

movements are undertaken by vehicles which are estimated to be 25,000 (Cape Coast Metropolitan Assembly, 2012; Owusu, 2012). From a general observation, most of the road facilities have very little provision for pedestrians hence it is very easy to find both pedestrians and vehicles competing for the road. These pedestrians included both the able and persons with disability who constitute the largest proportion of victims of road accidents.

Historically, most roads constructed in the metropolis are narrow with buildings right at the edges (Amoako-Sakyi, 2010). This makes it difficult for city authorities to designate routes for pedestrians in general as well as persons with disability in particular. The 2010 Population and Housing Census ranked the Central Region 4th with 3.4% of the disabled population. Out of the national total, the blind or visually impaired constitute the highest proportion (40%) of persons with disability (GSS, 2012). Aside the little consideration for pedestrians and persons with disability in the provision of transport infrastructure, provision of transport services like vehicles have very little or no consideration for these people especially when none of the vehicles in the metropolis can be described as disability friendly.

Situated in the Cape Coast North Constituency, the University of Cape Coast was established in 1962 primarily to train teachers at all levels of education for the country and this function is still fulfilled. At the time of establishment, the university was affiliated to the University of Ghana, Legon.

At present, the University has expanded its curriculum and added other programmes of interest to national development. Some of these additions include Bachelor of Art, Business programmes, Law, medicine and other related Science programmes including Forensic Science. With the advent of all these

programs, the University of Cape Coast has still not lost track of its primary duty as students who pursue education programmes account for at least 60 percent (%) of the student's population and for every course in the Humanities, School of Business and some part of the Sciences, there are replica of such specialised courses in the educational fraternity. With reference to educational attainment, the University undertakes courses at the undergraduate and graduate levels.

In addition to the above, the University admits applicants who meet the minimum cut off point of grade 24 but special concessions are made for person with identified disability. In attending to the needs of person with disability, the University has established a resource centre for visually impaired which translate students notes to braille. As a step to ensure that disable fresh students are familiarised with the school, a special orientation programme is offered to them and this includes a familiarity tour to most parts of campus. Further, the university charges no shuttle fares when any disabled student uses the school shuttle.

Target Population

All students with physical disability in the University of Cape Coast constituted the target population since the barriers to mobility are greatly felt by the identified groups (Louca-Mai, 2003; Marilyn & Alan, 2007; Graham & Jon, 2007; Addo, 2014; Asante 2012). For the purpose of the study only wheelchair users and the visually impaired were selected since these are the most if not the only group of students with disability on campus. Addo cites the need to select only participants who identified themselves as impaired. The choice of the

target population also depended on the respondent's realisation of his/her impairment hence if the respondent did not consider himself or herself impaired, such a person was not included in the target population though he or she exhibited visible evidence of physical impairment.

In an attempt to evaluate stakeholder's response to the mobility needs of students with physical disability, the study also targeted the Director of Physical Development Estate Management who controls the spatial landscape of University of Cape Coast and oversees the construction of structures including road facilities and buildings. In this light, the study deemed it necessary include Director of Physical Development Estate Management. The second target was the Dean of Students whose outfit oversees the welfare of all students. Finally, the study targeted the Transport Officer since his outfit manages every campus shuttle and the drivers who handle these shuttles. The role of the Transport Officer in ensuring drivers compliance to transport management practices places him in a position of a key stakeholder when it comes to the road transport infrastructure in UCC.

Sample size

Obtaining the total number of students with disability from the students' records of the University of Cape Coast was not possible since this data was not available. Though officials from the students' records could provide a database of all regular students which could be sorted by the name, hall of residence, programs and courses, this data was not of any help since the criteria for sorting students by their disability status was not included in the database.

The researcher relied on the resource centre for the visually or partially impaired and the Association for the Disabled Students (ADS) on campus. In all, the University had 31 visually and partially impaired students and one wheelchair user as at the time of the study (See table 1). A breakdown of the sample can be seen in the Table 1.

Table 1: Sample frame

Type of impairment	Level	Female	Male
Visually impaired	100	1	3
	200	2	9
	300	3	3
	400	2	6
	800	0	2
Wheel chair user	100	0	1
Transport Officer	N/A	0	1
Head of Project	N/A	0	1
Dean of Student	N/A	0	1
Total		**8**	**27**

Source: Office of Disability Studies, UCC.

Due to the relatively small number of the target population, the researcher recruited the only wheelchair user, all visually impaired students, the Transport Officer, The Heads of Project and the Dean of Students since they could be reached within the time allocated for the study. In all, 35 participants were recruited for the study.

Sampling procedure

Non-probabilistic sampling techniques was used in selecting participants for the study. In this regard, the study employed snowballing for all visual impaired students. The basic criteria for selecting the participants were;

the respondent should be a student, possess a physical impairment and be willing to engage in the study. For Hancock, Ockleford, & Windridge (2007) and Ma (2010), snowball sampling is best for participants with disability given their uniqueness.

An initial visit to the visually impaired resource centre revealed that some students, with low or blurred vision had declined to use the resource centre since they do not consider themselves as visually impaired hence the need for snow balling by concentrating on the traditional halls of residence. The University as part of its students' policy has made it compulsory for all traditional halls of residence to provide accommodation for students with disability throughout their stay on campus hence locating these participants posed little challenge. To accomplish this sampling procedure, the researcher identified one partially impaired student in the resource centre and he further directed the researcher to other students of the same characteristic.

Purposive sampling was employed in selecting the Transport Officer, Director of Physical Development and Estate Management and the Dean of Students in the University of Cape Coast. Though this sampling method does not give room for any sampling error and quality of the data from this sampling method is subject to the discretion of the respondent. Palys (2008) admonishes researchers to be circumspect on who they select as well as look for other ways to validate the information derived. Being the only respondent of his kind, the wheelchair user also selected purposively since his location was known to the researcher.

Research Instruments

The main instruments used were the interview guide and auditing scheme and these were guided by the objectives of the study. In obtaining an in-depth understanding of the experiences of students with physical disability, a semi-structured interview schedule was employed. This provided the researcher the opportunity to ask follow up questions that would not be permitted in the case of a questionnaire. By so doing, the researcher was able to monitor the respondent's behaviour as they interacted and this allowed the researcher to read meaning into his behaviour. Having observed the respondent, the researcher was able to tell if the respondent was not comfortable with a particular question hence effort was made to rephrase or avoid questions like that. The decision to use the interview guild is in line with the views of Bryman (2008) and Creswell (2012) who claim that, the above-mentioned instrument affords the respondent the opportunity to express him or herself in a fashion that suit them since they are given the luxury of seeking clarity from the interviewer as well as making decisions on what questions they would want to answer.

The study developed four interview guides for the sampled participants. For students with physical disability, the interview guide was categorised into three themes ranging from respondent's view of what the concept of disability is, respondent experience in his or her usage of the road and vehicular conditions in the University of Cape Coast. In this light, the participants shared their experiences in using existing road facilities like curb, sidewalks, path obstruction, bus-stop facilities, entering campus shuttles and also shared experience on their encounter with non-disabled students when using campus transport facilities and services. Respondent also identified some disability

friendly facilities they have come across as they manoeuvre their way on campus. Such facilities include boarding platforms at shuttle station, designated or priority seats/space as well as curb cuts at crossing points.

Aside the students, stakeholders including the Transport Officer, Dean of Students, and the Director of Physical Development and Estate Management were also interviewed. The designated interview guide was structured to elicit response on measures that are put in place to meet the mobility aspiration of students with physical disability. At this level, responses on activities undertaken by the Transport Officer to meet the mobility aspiration of the students with disability were elicited. This included questions on inputs his outfits make in the acquisition of shuttles for University as well as the conduct of the drivers who handle the buses on campus. The Director of Physical Development and Estate Management also shared views on his activities and this range from the setting up of traffic lights, pedestrian walkways and ramps at various points on campus.

In addition to the above, the study also relied on an audit scheme to validate the presence, condition and dimensions of the existing disability friendly road and vehicle facilities that were present in the University of Cape Coast. With the auditing scheme or observation checklist, facilities available within the University of Cape Coast were observed and compared to that of the International standards as outlined in Chapter Two. This assisted the researcher to appreciate the plight and opportunities available to students with physical disability on campus. Creswell (2012) cites the difficulties of measuring the behaviour of participants when one uses an audit scheme since an individual behaviour may be influenced by factors including emotional, financial, medical

and environmental factors. This challenge had no impact on the study since the focus of this instrument was to examine the existence of fixed physical infrastructure whose presence may not be influenced by commuters' interaction.

Data collection procedure

With a well-organised institution like the University of Cape Coast, an introductory letter was obtained from the Department of Geography and Regional Planning and the researcher went ahead to declare his intention to all appropriate sections. To make intentions known, the researcher formally wrote to the Dean of Student's office, Students Disability Association, halls of residence, the Transport section and the office of the Director of Physical Development and Estate Management. In all cases, the researcher briefed them about the study.

In addition to the letter, the researcher included copies of the instruments (interview guide and auditing scheme). Since the official language for Ghana is English, all instruments were typed in English but the researcher also made room for foreign students who may not be in a position to read and write English well. This was accomplished by engaging the service of an interpreter who could speak both English and French since the researcher could only speak and read English.

In order to examine the transport facilities on campus, the auditing scheme or observation checklist was used to assess the facilities at 100-metre interval using the University East Gate as the reference. The assessment of the selected facilities on the route is similar to the calculating Walkability Index which describes how friendly a route is given indicators like presence of

pedestrian crossing signs, speed ramps and walkways. A hundred metre was used since it was relatively short to observe and take accurate reading of all indicators on the route. Secondly, the study sought to produce a detail assessment of the route hence anything greater than a hundred metres might translate to aggregation of indicators.

In demarcating the 100-metre mark, the study employed the use of 'my tracks' which is an android based mobile phone application that allows users to plan their trip when commuting from one point to the other. In using the University's East gate as a reference point, the mobile phone application allowed the researcher to map out every route that was used for the assessment and once this was done, the mobile phone application automatically demarcate the 100-metre mark across mapped out routes.

Upon reaching the 100-metre mark, the application emits clear audible signals that would alert the researcher of his location. The use of this application further reduced the tendency of duplicating assessment on any particular route since the application clearly provided a colour coding that helped to differentiate covered distances from the ones that had not been covered.

The application was under laid by Google earth and works over the internet hence it provided real world data which allowed the researcher to measure the angle of inclination of a particular route since the degree of inclination of a route was identified as a key determinant when assessing the mobility needs of commuters with physical disability.

Also, the researcher observed selected activities of the shuttle operators on campus. The outcome of this observation was used to confirm or contradict the assertions of the participants. Variables observed included the presence of

inscription indicating priority seat or designated spaces for students with physical disability, drivers' behaviours like asking students without disability vacate a seat for students with physical disability, drivers' patience in waiting for students to alight or join the shuttle as well as the extent to which brakes of vehicles were applied. These observations were done both at the shuttle station and in the shuttles when the shuttles ply from the Old Site to the New Site or vice versa. To ensure the reliability of the data, a third party was requested to observe the variables and at the end of each trip, the observations from the researcher was compared to that of the third party. This was done to remove biasness in the data collected.

Data Analysis

Data from the auditing scheme was analysed by the use of Statistical Package for Service Solution (SPSS) version 23. This was used to describe the number, condition and elevation of selected road and vehicular indicators at a 100-metre interval. Here frequency, percentages, cross tabulation and charts were used as the basic tools for analysis.

The interviews were recorded by the use of a tape recorder and field notebook. The researcher did a verbatim transcription by using NVIVO version 9 since the software afforded the researcher with the flexibility in typing especially when it comes to removing unwanted materials like background noise, reducing tempo of recording during transcription as well as classifying the data into summary themes.

By selecting the emerging themes, the analysis of the qualitative data combined the summary views of the participants with captured scenes and

annotations which were taken from the transcribed text. Analysis from this approach created a mental picture of the mobility needs and challenges of students with disability. The findings from the qualitative data was further used to confirm or contrast the findings from the auditing scheme.

Challenges from the field

This study encountered a number of challenges some of which include the following;

Obtaining details on the number of students with physical disability from the student's record was not successful as the database shown did not include a column that classified students under the type of disability. Data from the student's records classified students on many categories including name, hall of residence, telephone number and program hence this data could have easily helped the researcher in locating the participants. To overcome this challenge, the study relied on the Office of Disability Studies which offered the total number of visually impaired students and their level of academic standing. Since the University offers them with accommodation throughout their stay in school, the study further went through the various halls and used the snowballing approach to identify all participants.

With the different time schedule for the participants, scheduling of meeting with the visually impaired for the interviews was not easy since this meant that these students would have to sacrifice a proportion of their time for me. The study had to reschedule many meeting time since the participants could not show up as a result of busy academic calendar. While some visually impaired showed outright disinterest in the study, some of the students gave the

researcher a difficult time since the researcher had to call and visit them on several occasions before they agreed to participate in the study. To overcome this challenge, the researcher conducted the interview sections on weekends since this was the most preferred period for the participants.

It was observed that two visually impaired students did not live on campus. Though their contact numbers were obtained, agreeing to meet in person was the challenge. So, the researcher conducted a telephone interview with the respondent in Amamona and conducted the interview with the other student in his residence at Kwapro.

Through the Transport Officer and the Head of Projects at the Directorate of Physical Development and Estate Management were readily available, getting the Dean of Students in person was another challenge. In return the Dean directed the study to his aid who served as a reference for the study. Though the aid to the Dean provided answers to the questions asked, it was believed the Dean of Students would have offered the best responses since he had attended most meetings that bothers on disability issues in University of Cape Coast.

CHAPTER FOUR

RESULTS AND DISCUSSION

Introduction

This chapter presents the main findings of the study and situates them in the context of the theoretical and conceptual framework. The chapter is in three parts: Part one covers the physical barriers that impede the movement of students with physical disability; Part two examines the extent of usage of University shuttles by students with disability and Part three outlines the role key stakeholders in addressing the views of persons with disability on campus. The auditing scheme and the outcome of the interview schedule were the main sources of information for this study. Preceding the three parts is a brief outline of the socio demographic characteristics of the participants.

Socio-demographic characteristics of participants

The choice of a mode for a trip may be influenced by the background characteristics of the commuters. Though road transport is the only means of transportation on UCC campus, a commuter's background can influence his or her choice to rely only on the passenger facilities, pedestrian facilities or a combination of both. Consequently, information was sought on some socio-demographic characteristics of participants that had a bearing on the study. The socio-demographic variables covered in this study included age, sex, educational level, halls of residence and type of disability suffered.

From Table 2, out of the total of 27 students, 66.7 percent were males as against females who constituted only 33.3 percent. Although the Ghana Statistical Service (2012) reveals that Ghana has more females (52.5%) with disability than males (47.5%), data provided by this study proved different. In accounting for the difference, Mantey (2014) has observed that cultural practices and the stigma attached to bringing up children with disability contributes to the poor enrolment rate for disabled persons in primary schools especially amongst females. In the wake of pursuing higher educational attainment for the various sexes, males with disability are usually given the privilege. Also, the offering of specialised schools for these students come with higher financial commitments than that of the regular educational system for children without disability. To this effect, these children do not find a well suitable educational environment that would meet their needs and this is known to decrease the termination point of disabled students in schooling. Mantey (2014) further argues that even if some parents can afford to raise their children in specialised schools, culturally ingrained practices may push some of these parents to choose their male children over the females when it comes to higher educational attainment.

From Table 2, 55.5 percent of participants were between the ages of 23 and 28 years and this age constitutes the age group in which most undergraduate students fell within. Aside this age group, students within the ages of 17 to 22 years constituted 33.3 percent of all participants and this largely includes first year undergraduate students. On the other hand, students within 29 to 34 years and those above 34 years constituted 7.4 and 3.7 percent of participants respectively.

With reference to the halls of residence, the study found that most of these students with disability lived at the New Site (59%) which habours most of the commonly used educational facilities on campus. For students at the New Site, walking was the most preferred travel option when commuting from their residence to an academic facility. In terms of halls of residence, the study revealed that Casely Hayford (33.3%), Valco (22.2%) and Kwame Nkrumah (3.7%) halls. On the other hand, the Old Site comprised Adehye (11.1%), Oguaa (22.2%) and Atlantic (7.4%) of students with disability.

The last demographic characteristic is the type of impairment suffered by the respondent. The study revealed that the visually impaired students constituted 96.5 percent as against wheelchair users who represented only 3.5 percent of the total participants. In providing tailored services to the needs of these students, the University of Cape Coast has a resource centre dedicated to the academic needs of the visually impaired. At this centre, brail and other supportive services are offered to these students which makes the University more attractive to the visually impaired.

Table 2: Socio – demographic characteristics of the participants

Variable	Frequency	Percentage
Sex		
Males	18	66.7
Females	9	33.3
Age		
17 to 22 years	9	22.2
23 to 28 years	15	55.5
29 to 34 years	2	7.4
Above 34 years	1	3.7
Hall of residence		
Casely Hayford	9	33.3
Valco	6	22.2
Kwame Nkrumah	1	3.7
Oguaa	6	22.2
Adehye	3	11.1
Atlantic	2	7.4
Type of Impairment		
Visually Impaired	28	96.5
Mobility Impaired	1	3.5

Source: Fieldwork, 2016.

Part One: Physical barriers to pedestrians with physical disability

This section discusses the physical barriers to students with disability as they commute on campus. The findings from the auditing scheme was compared to sections 23 to 30 of the Persons with Disability Act (2006), the UCC Policy for persons with disability, and the UNDP's (2010) review of international best practices in accessible public transportation for persons with disability. In this regard, the themes for discussion was on the presence, condition and/or dimension of pedestrian sidewalk, curb, drop kerb, crossing points, rest spots, traffic control signals and crossing points.

Sidewalk presence and condition

Throughout the study, the most dominant pedestrian facility observed was pedestrian sidewalk, which ensured a complete separation of pedestrians from vehicles. In all, routes with sidewalk constituted about 80 percent of all segments examined for this study and these included routes at both the Old Site and the New Site. Though the pedestrian sidewalk was dominant, its condition and dimension did not fully follow the prescribed dictates of an integrated transport system as cited by the UNDP (2010). Observed sidewalk width in the University of Cape Coast ranged from 1.05 to 2 metres and this dimension conforms to DFID's (2004) ideal sidewalk width from 1 metre in areas of limited space to 2 metres in areas with ample space. This dimension is ideal since it permits at least a wheelchair user and a non-wheelchair user to use the sidewalk at the same time without any collision. Though the width of observed sidewalks conformed to UNDP's (2010) view, not all parts of the roads on campus had sidewalks.

Sections of campus which did not have sidewalks included the route from Agricultural Development Bank (ADB) to the 4-way junction at Zenith Bank as well as other areas of high pedestrian traffic like the route in front of the Sasakawa hostel. Sidewalk discontinuity, as it is called, exposes both students with and without disability to a high risk of accident since the only option for pedestrians is to share the road with vehicles. From the study, sidewalk discontinuity was the product of incomplete construction of sidewalk as well as the location of offices within areas of high pedestrian traffic as seen in Figure 7. These offices had car parks, which would only be used when sidewalks are removed. Areas of modal conflicts as enumerated above exposes pedestrians to a high risk of injuries especially when it involves vulnerable groups like students with physical disability who are deemed to have a slower response rate to danger than students without disability (Amoako-Sakyi, 2010; Maljotra, 2010).

Figure 7: Discontinuity of sidewalk at Sasakawa and FELT junction.

Source: Fieldwork, 2016.

In recounting one's usage of a route without pavement, a Level 300 visually impaired male at the New Site revealed that:

> *It is a bit difficult because you don't know which section of the road to walk. For instance, if there were pavements, I would have used my white cane to trace the edges of the pavement while walking. Tracing the edges of the pavement would allow me to tell if I am moving off the pavement. In our current state where some roads do not have pavements, there is no way to tell if you are moving to the left or right especially when walking on the edges of the road. Sometimes, some drivers toot their horns to alert me when I veer off into the main road while walking on routes without pavements. For me, it's very difficult to trace where to walk on route with no pavement. Last Saturday, that is three (3) days ago, a driver tooted his horn and immediately, I realised that I was walking in the middle of the road. One man approached me and asked if I wanted to cross the road since I was right in the middle of the road. Knowing very well that I had no intension of crossing, I told the man and he then directed me onto the pavement in front of Graduate Hostel before I was able to use the pavement.*

The account of a Level 400 visually impaired female student at the Old Site is as follows:

> *It is hectic because other vehicles will also be using the road at the same time. And since there are no pavements they (the drivers) move without boundary, (that is) they move anyhow (without caution). Sometimes, because there are no pavements, drivers park*

their cars along the edges of the road which would be the only available place for us to walk on. In this case, we are forced to walk in the middle of the road and we may even be knocked down by a vehicle.

When asked if this same respondent had ever run into a moving or parked vehicle or vice versa, he responded:

Yes! In front of Oguaa Hall and in front of the Old Library and this was just last week. I was in the company of another visually impaired student and on our way from the Old library. we realised that a driver was fast approaching us. Not knowing what to do, we raised our hands to signal the driver that we were confused on what decision to take. People were shouting to draw the drivers' attention that we were visually impaired. I don't want to use any derogatory word but the driver asked if we are mad. He was rather asking if we are mad when indeed common sense should tell him that no able person would stand in the middle of the road and raise his hands when there is a car coming. For what reason. But this driver asked us whether we were mad. We lifted our hands to signal him that we were confused but the driver ignorantly asked whether we were mad.

Though Padzia and Fuziah (2012) cite previous training and experience as the principal factor that guides the movement of the visually impaired, Venter (2011) downplays this principal role since visually impaired travellers are not in a position to see and take precautionary actions when travelling on routes without pavements. To Ventor (2011), separation of road users through the

provision of pavements always comes first when the safety of road users is thought of. With this separation, all road users would have exclusive route for their usage. For the wheelchair user, the road presents a more favourable walking environment whether or not a sidewalk is present. With sidewalk discontinuity and poor conditions of the sidewalk, the only wheelchair user employed for the study revealed his exclusive usage of the road since it presents a level planed route with without any path obstruction object.

For routes with pavements, the condition of these pavements plays a major role in determining the level of convenience in its usage. The basis for rating the level of convenience in using these sidewalks was on the degree of dislodged bricks, poorly fitted bricks and how even the surface was, irrespective of the path material used. Data from the field survey revealed that, only 41.9% of routes with pavements on campus were rated as good and these were routes with no path obstruction, well fitted bricks and even surfaced pavement. The poor and average rated routes recorded 41.9% and 16.2% respectively and these were areas with one or a combination of dislodged bricks or potholes, electric poles and signage on pavement as well as an uneven pavement surface. If the segment in question had at most two electric poles or sign post, a relatively small pothole and a fairly even surface, this route would pass for a pavement that presents an average rating in terms of convenience. On the other hand, any route with at least, two electric poles, many potholes and a rugged surface would qualify for a route which offers the least convenience and would be rated low or poor in convenience.

Data from the study further revealed that some areas with dislodged bricks as seen in Figure 8 were the product of construction work which had to

be done on that part of campus and typical among them is the pavement adjacent to CASFORD, UCC parliament house and the junction at Faculty of Education Lecture Theatre (FELT). Other areas of dislodged bricks were also as a result of poorly laid bricks which got displaced after some rains as seen in Figure 8. Evidence from the fieldwork revealed that, such a situation discourages students with disability since the use of the sidewalk becomes their least likely travelling option. In these cases, the study witnessed some visually impaired users who had to walk on the road when they got to some of the identified sections of the pavements while commuting to the junction at FELT. This may further hinder disabled students' access to certain services, which may easily be enjoyed by students without any form of disability. The above situation contravenes the UNDP's (2010) ideal description of an accessible sidewalk since its recommendation makes room for a well-levelled route with no path obstruction and well-fitted path materials.

Figure 8: Dislodged bricks on the Sasakawa Road

Source: Fieldwork, 2016

In providing sidewalks to separate pedestrians from vehicles, the rate of usage of these sidewalks would heavily be impaired if there are objects that stand in the path of pedestrians. In the view of Ferreira & Sanches (2006), these objects obstruct the flow of traffic and influence disabled travellers' choice of route that presents the least obstruction, forfeit the intended trip or share the road with the vehicles even though there is a sidewalk present. Out of the 38 segments reviewed for the study, 52.6 percent of the segments recorded the presence of objects on the sidewalk that restricted the free movement of pedestrians. Notable among these objects were streetlights, signposts, protruded tree branches or roots, dwarf walls and potholes. The position of these objects reduces the width of the sidewalk which makes it a challenge for students with disability especially wheelchair users. In taking measurements, the study revealed that electric poles were between 0.6 and 0.67 metres from the curb and that these poles lay on a 2-metre sidewalk. The loss in sidewalk would either translate to competition for space in such areas or commuters resorting to the road as an alternative anytime they reached such sections on the sidewalk.

Addo (2014) cites commuters with disability fear of competing with non-disabled persons as a key determinant that influences disabled persons' usage of any facility. Other path obstructing objects found were vendors taking over the pavements from the junction at Zenith bank to the pavement in front of Sasakawa hostel. The presence of these objects further contravenes the UNDP's (2010) recommendation for an accessible pedestrian facility since sidewalks are expected to have a clear path without any hanging, protruding or obstructing objects. Figure 9 shows segments with obstructing objects. It should be noted that all these objects were not found on the same segment throughout campus.

Indeed, objects like electric poles and signage were only found to the right hand of the road when one approaches the North Campus (Science) from Casely Hayford hall. Potholes on the other hand were found on both the right and left sides of the roads with pavement.

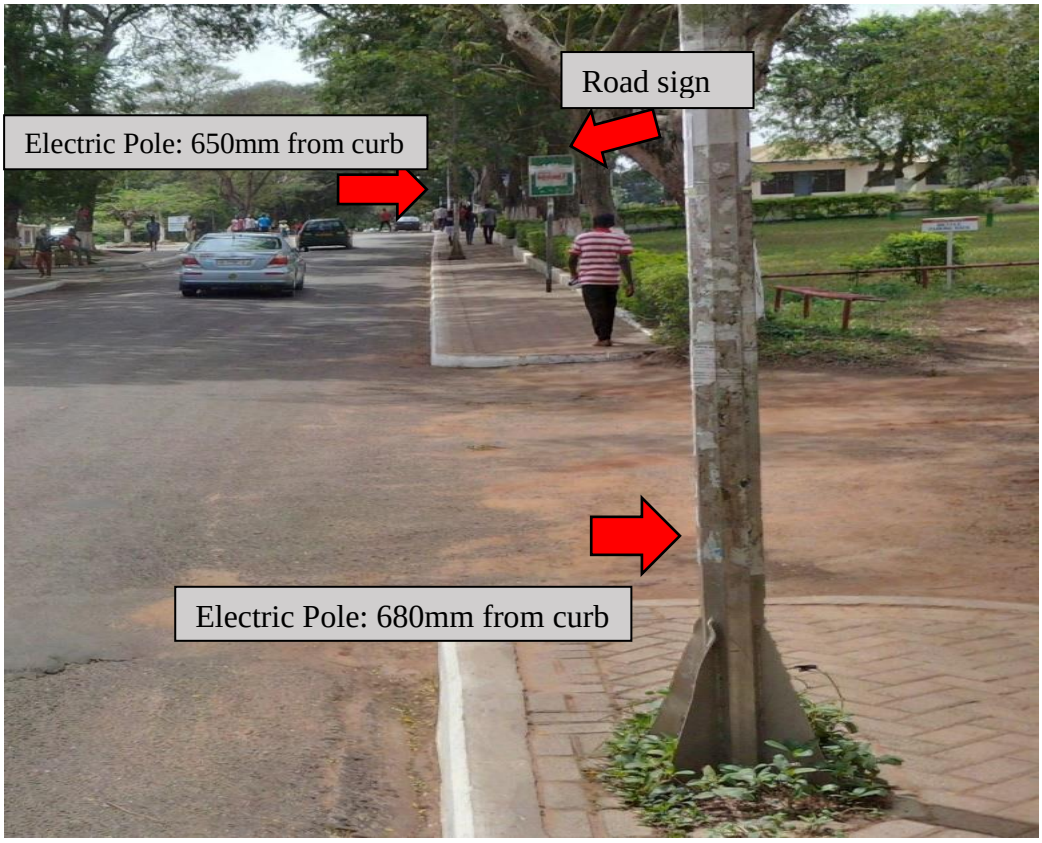


Figure 9: Segment with objects close to Graduate Hostel.
Source: Fieldwork, 2016

In recounting participants experience in using pavements with path obstructing objects, a Level 300 visually impaired female student from the New Site indicated that:

> *Some of the pavement have potholes so when you are a little distracted while walking on such pavements, you may step into a stagnant water or even step in those pits which may cause injuries. Some sections of the pavements have road signs or sign post erected in the middle of the pavement. With these ones too, if you*

are not aware, you may easily bump into some of them especially when you are walking from FELT to SSNIT junction. Also, when you are from Valco Hall while using the left pavement to the North Campus (Science), there are some tree branches which have protruded into the pavement. So, if you walk there and you are not a bit careful, you may hit your head or crash into some of the branches. With some places, too, you will encounter electric poles in the middle of the pavement. With these things in such places, you will easily hit and sustain some injuries while walking on such routes. The other challenge is the presence of an ice cream vendor and other hawkers who sell their products on the pavement. These people will not even move their goods when they see me coming and when I bump into them, they don't even apologise to me. It's very annoying sometimes.

In using the pavement, a respondent (the only wheelchair user) observed as follows:

Well some of the bricks are dislodged from the pavement and this includes the pavement adjacent to CASFORD. When I get there, I have to adjust my wheelchair so that I can use the one end of the wheels on the solid edge of the pavement whiles the other goes into the pothole of the pavement. I then pull myself until I get to the end of the pot hole. The pavement is in a bad condition and the Hall president has even seen it but has done nothing about it. Because they can easily walk on their feet, they don't see the need to do anything about it. For me I don't have much problem but I worry

for the visually impaired since they can easily trip and fall when they become the least careless.

The above assertions conform to views held by Ventor (2011) and Frye (2013) and whose works revealed that the presence of objects, like those mentioned above, were considered in disabled travellers trip schedule. A higher degree of these objects may result in abandonment of trip hence a reduction in enjoyment of basic services among these groups of road users. With UCC being an academic institution where lectures are deemed critical, these students endure the trouble in commuting on such routes every time they move from their residence to the lecture theatre.

Curb and curb cuts

In addition to the provision of sidewalks for all road users, the autonomy of wheelchair users in particular will still not be guaranteed if complementary accessories like higher curbs and curb cuts are not included in the construction of sidewalks.

Observation of the road attributes revealed that 20 out of 38 segments recorded curb heights ranging from 130 to 180 millimetres. In Hoy's (2003) and McNulty's (2003) recommendation, a minimum curb height of 130 millimetres ensures the safety of road users since this height is significant to alert any driver of a change in height if he/she is transitioning from the road to the pavement where the driver is not expected to be. At this minimum height, pedestrians are also deemed safe since a car cannot easily find its way onto the pavement unless the driver has deliberately decided to park on the pavement. For the visually impaired and the wheelchair user too, the relatively high curb offers guidelines

to detect the edge of the pavement and also identifies any significant change in height as he or she moves from the pavement to the road and vice versa. The remaining 18 segments that recorded curb height of less than 130 millimetres as shown in Figure 10, were mainly routes without pavement as well as other roads with low pavement like the route from the junction at FELT to the North Campus (Science) Shuttle station as well as the route from GCB at the East Gate to the Science Taxi Station in between Kwame Nkrumah Hall and Valco Hall.

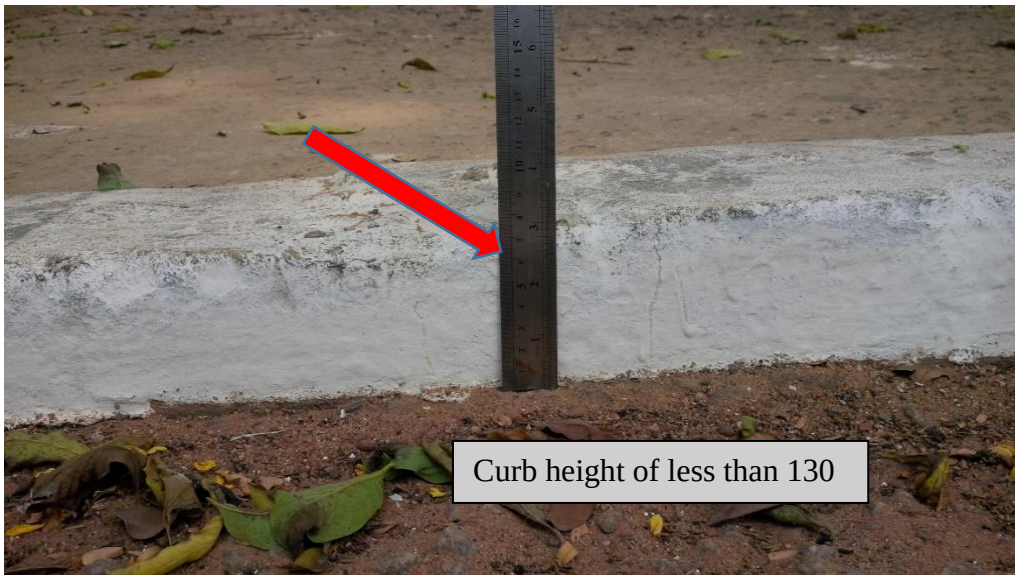


Figure 10: Height of curb is less than 130 mm on the road to GCB at the North Campus.

Source: Fieldwork, 2016.

Though Hoy (2013) calls for a high curb to ensure and sustain the safety of travellers with disability, the UNDP (2010) further calls for accompanying curb cuts or drop kerbs to facilitate wheelchair and visually impaired users in accessing these sidewalks. In simple terms, curb cuts are to be placed at points where one would have to transit from the road to the sidewalk or vice versa, and without this facility wheelchair user in particular would find it extremely difficult to join the sidewalks with minimum curbs height of 130 millimetres.

From the data collected, only 4 out of 38 road segments recorded curb cuts at different locations such as the route along Institute for Development Studies (IDS), in front of Sasakawa Conference Room, the bus-stop at the North Campus (Science) shuttle station and on the sidewalk approaching the Main Library from the shuttle station.

Routhier, Claude, Desrosiers, & Nadeau (2003) in the 'Rational Model of wheelchair mobility' reveals that the position of wheelchair users in the wheelchair pulls the centre of gravity of the wheelchair closer to the ground and this makes it difficult for him or her to propel himself above a height of 130 millimetres. The absence of drop kerbs at various points of intersection between sidewalks and the road as represented by the yellow arrow in Figure 11 results in a total abandonment of sidewalks by students in wheelchairs hence resorting to the road as a better alternative for wheelchair users.

From Figure 11, for commuters on the sidewalk with the blue arrow, the presence of the drop kerb would easily facilitate the transition of a wheelchair user from the road to the sidewalk. However, a wheelchair user on the sidewalk with the yellow arrow would find transition difficult due to the high curbs and the absence of the curb cut on this section of the sidewalk.

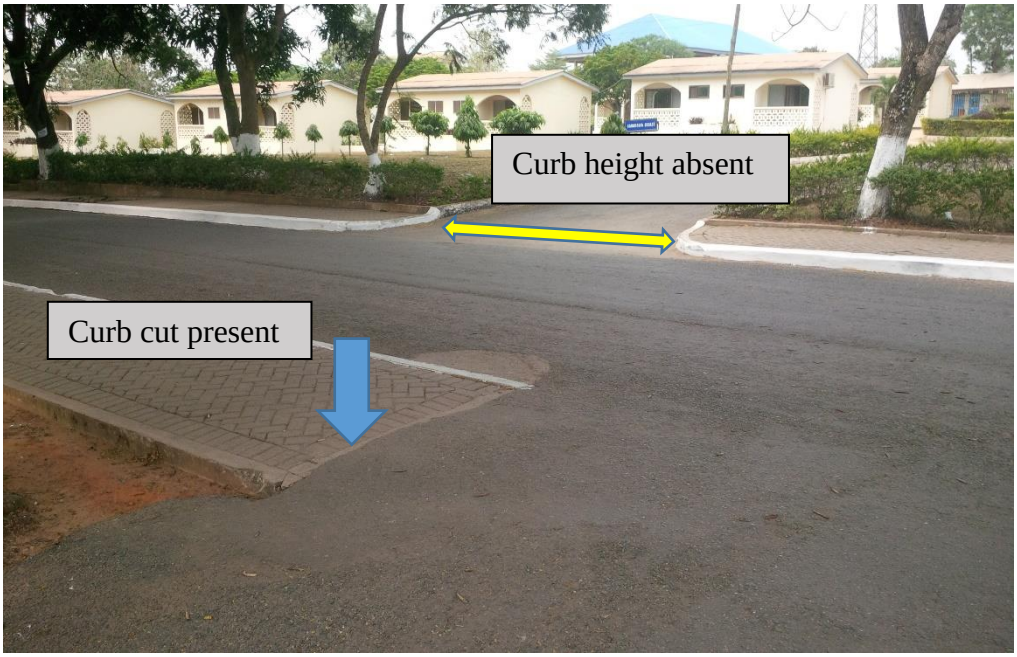


Figure 11: Curb cut present at the blue arrow and no curb cur at the yellow arrow

Source: Fieldwork, 2016.

In a discussion with a Level 200 wheelchair user on a pavement without curb cuts at the New Site, it emerged that:

> *It is not easy! You need someone to assist you to get to the pavement. The edge of the pavement is not flat where I can easily pull my wheelchair unto the pavement so I need someone to assist me to get on the pavement. Most of the time people help me but for me in particular, I don't depend much on people's assistance. You see, in University of Cape Coast, it's believed that everyone is busy so when they are going, I think they are busy so I don't bother to ask other commuters for assistance in getting onto the sidewalk. If you feel like pushing me unto the pavement, it is accepted but normally, they don't push me. At times, I would pull myself from CASFORD to my lecture and back to CASFORD while using the road instead of the pavement.*

Though the visually impaired stand the risk of falling when they are not aware of sudden change of height, Addo (2012) reveals that, the use of white canes by these students offers them with enough information to identify a sharp change in height. Since their movement is done on foot, the absence of a drop curb does not present much challenge to the visually impaired as compared to the wheelchair users. It must also be noted that, the provision of the curb cuts does not only benefit the wheelchair user but goes a long way to benefit mothers with trolleys and temporarily sick persons who may not be in a position to use such height.

Walking distance and rest stops

The limit to the distance to which persons with disability can walk differs substantially from persons without any form of disability. The DFID (2004) recommends that maximum walking distance without rest for disabled travellers is about 150 metres. DFID further states that, the ability to make such journeys are dependent on the length of route of travel, the type of mobility aid in use, gradient and condition of the route. To this effect, basic facilities should be closest and easily accessible by these disabled commuters.

Using the persons with disabilities resident at the New Site comprising Casely Hayford, Kwame Nkrumah and Valco Hall, the least walking distance for which these students would have to travel to access any academic facility is about 83 metres and this mostly relates to the students from Casely Hayford who may attend lectures at Café Roof Top. Since most of these students are in the Faculty of Arts and attended most of their lectures at the New Site which also habours the Resource centre for the visually impaired, the least recorded

distance from Casely Hayford Hall (which is the closest Hall to the Faculty of Arts) is about 1 kilometre which is 600 metres in excess of the 400 metres recommended by the DFID (2004). In the DFID's assertion, basic facilities should be within a 400-metre reach to commuters with disability but this recommendation has been breached since the closet academic facility that is used by most of these students is about 1 kilometre from their residence.

Though some of these students have their lectures at the Old Site, the longest walking distance to the nearest lecture theatre for students' resident at the Old site is about 420 metres (which was from Atlantic Hall to the Old Library). Though the estimated distance in this case was in excess of the recommended walking distance most of these students with disabilities identified the New Site as harbouring most of their lecturers.

With relatively long walking distances, the UNDP (2010) further calls for the provision of rest stops at regular interval since travellers with disabilities have a relatively shorter walking distance without rest. To this effect, these rest stops should be at a maximum of 100 metres' interval. This means that a 400-metre trip should have at least four (4) rest stops with seats, space for wheelchair users and shelter. From the data collected, the minimum walking distance to a frequently used lecture theatre using students from Casely Hayford Hall was about 1 kilometre and no resting points were recorded in the field data. The only available form of shelter was the shade received from the tall trees that bordered the sides of the pavement, the forecourt of the offices or hostel as well as the students' summer hut. These summer huts were constructed by the Student Representative Council (SRC) in 2014, and was meant to be used by students for group and personal studies hence the presence of a white board. The seats

and tables are made of concrete and their arrangements have a circular pattern, which conformed to the circular shape of the summer huts.

From observations, these summer huts were mainly located close to all the traditional halls at the New Site, Oguaa hall at the Old Site and within close proximity to lecture theatres at the New Site. Of course, these summer huts are to be used for the purpose of studies though they can provide shelter to students in times of harsh weather conditions. From Figure 12, these summer huts lie about 40 metres from the road. Though the visually impaired may not have any problem in accessing this facility, the presence of the stairs at the entrance makes it difficult for any wheelchair user to use this facility. When asked of the presence of any rest stop that could offer them shelter from the rain, a Level 400 visually impaired male student revealed that:

> *I don't think so. There is nothing. I haven't encountered anything like that so when it is raining, I have to walk fast. I remember last semester, I was beaten by the rain because I was coming from the library to CASFORD and on that night, I was beaten by the rain seriously.*

On the account of a wheelchair user at the new site, the following observation was made:

> *The only shelters I know are the offices at Sasakawa. You may stand there to rest till the rains stop, then you continue to either your hostel or lecture. I haven't found any place I can seek shelter and move freely except for forecourt of Sasakawa hostel or offices. I also know of the shuttle station and FELT. When it is raining, I try to move fast to get to FELT. Once I am there, I know that I am*

safe. When I go beyond Sasakawa approaching CASFORD, I don't know of any place I can seek shelter when it is raining or anything like that.

In Adjei (2013), the absence of these shelters inconvenienced both disabled and non-disabled travellers since there is nowhere to enjoy some shelter when it is raining, during hot weather conditions or when commuters are tired and in search of a place to catch their breath. He concluded by stating that, unconventional shelters like the forecourt of offices do not best fit the intended purposes of these offices. Since these offices operate to service clients, having non-customers use the forecourts of these offices as safe havens do not augur well for the office operators. Figure 12 presents summer huts that were used by visually impaired as resting spots at the time of the data collection.

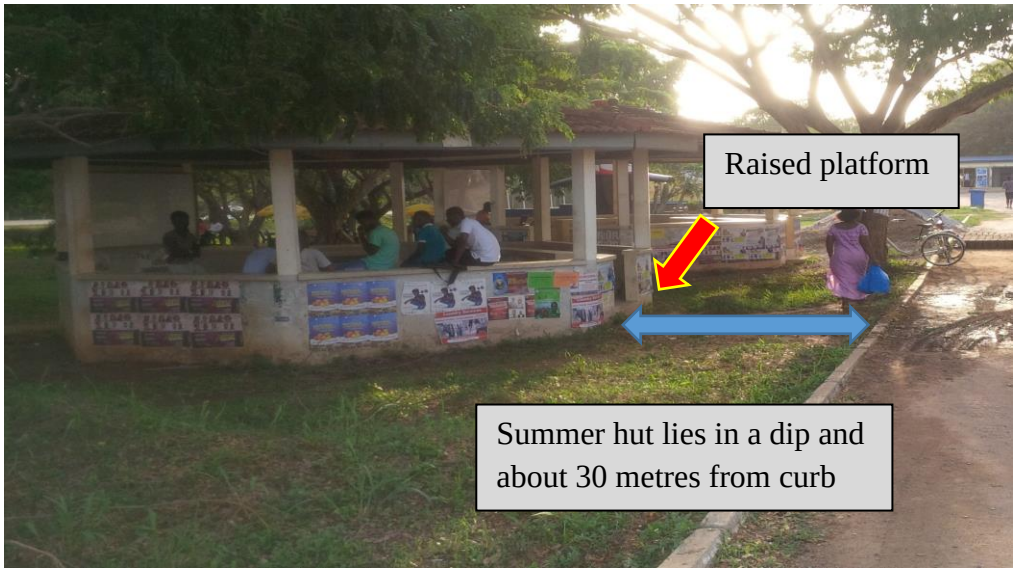


Figure 12: Summer huts on segment close to VALCO hall.

Source: Fieldwork, 2016.

Crossing aids

Crossing aids refer to tools that facilitate the safe crossing of a road by pedestrians. These include traffic light, Zebra crossing and pedestrian island for highways. In addition to the identified, complementary facilities like curb cuts, wider and clear pavements are also needed to ensure safe crossing. According to Adjei (2013), these facilities are needed to control the movements of all road users since disabled travellers react more slowly to danger and other unexpected situations than their abled counterparts.

The first element under review is the presence of zebra crossing which is needed to ensure a safe passage of pedestrians since it clearly outlines pedestrians' right of way. The DFID (2004) and Munyi (2012) recommends that, controlled crossing points should always have Zebra crossings that are perpendicular to the drop kerbs at the point of crossing. This means that, the width of the zebra crossing should be the same as the width of the floor of the kerb drop at that crossing point. From data collected, only three zebra crossings were observed on campus, and out of this number, two had no drop kerbs making transition for wheelchair users extremely difficult. These zebra crossings can be located at the shuttle station and the junction close to the Faculty of Education Lecture Theatre (see Figure 13).

Though the zebra crossing adjacent the Main Library has drop kerbs, the challenge here is the placement of the zebra crossing in relation to the drop kerbs. While Ventor (2011) identifies, the zebra crossing as the pedestrians right of way and should be perpendicular to the drop kerbs if the safety of disabled commuters is to be guaranteed. What exists on the University campus differs significantly from this assertion. At this crossing point, the student with

disability will have to move about 30 metres into the road if he or she would want to access the zebra crossing. This occurs on both sides of the road as seen in Figure 13. Moving about 30 metres into the road to access the zebra crossing increases the risk of injury or accident for wheelchair users and the visually impaired since they are slower in responding to danger that may befall them (Yong, 2010). This danger would be the risk of being knocked down by a vehicle once they move onto the road to access the zebra crossing.

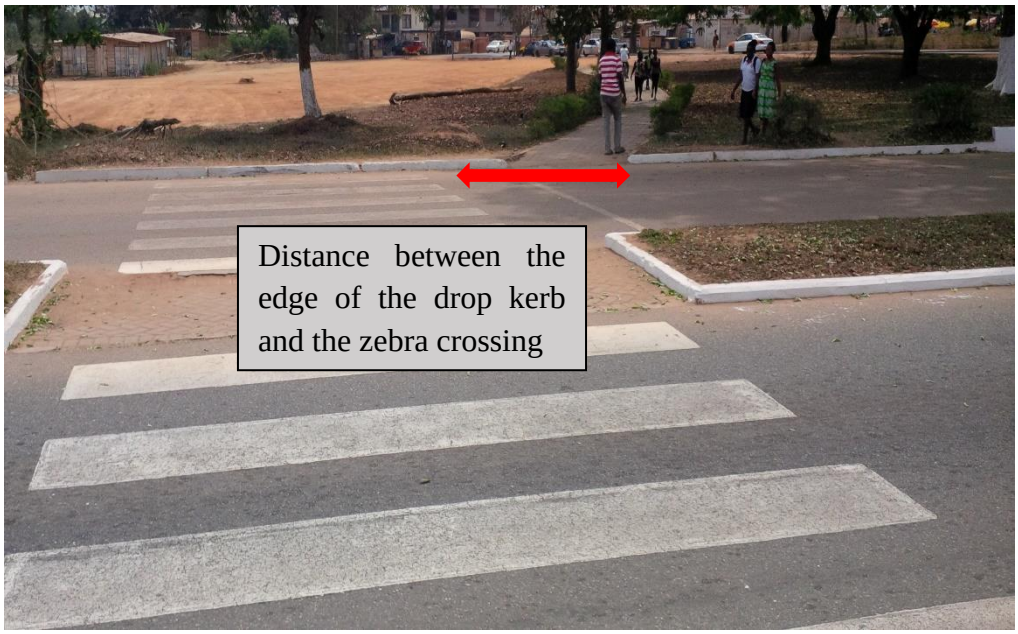


Figure 13: Zebra crossing beside the Main Library

Source: Fieldwork, 2016

Identifying controlled crossing points makes it easier to map out pedestrian right of way which is easily done by the use of the zebra crossing. From all the 4-lane intersection on campus, none of them had zebra crossings on all sides. The only junction that comes close to this is the 4-lane intersection at the Main Library. This junction has zebra crossing on two (2) sides leaving the junction from the Science Faculty and Science Market. The junction at Zenith Bank has no known controlled crossing point. Though there is a traffic

light at this junction, the traffic light only stops the vehicles to give right for pedestrians to cross but does not demarcate a clear control crossing path for these pedestrians. At the junction at the Faculty of Education Lecture Theatre only one zebra crossing was found and this is on route to the SRC hostel. In this location too, traffic lights and speed bumps are found but no other controlled crossing point is known apart from the zebra crossing on the route to SRC hostel. This situation contravenes Ventor's (2011) view on the need for zebra crossings on all sides of a crossing point. In their view, controlled crossing by the use of the Zebra crossing increases the safety of all road users in general and students with disability in particular since their right of passage would be made known to all road users including drivers of vehicles.

For the safety of students with disabilities who cross roads with more than two lanes, the presence of the Traffic Island also guarantees some degree of safety since it reduces the number of lanes to be crossed at a time. Instead of crossing a 4-lane highway at once, the pedestrian island is positioned in between the 4-lane road. This implies that, the pedestrian would have to cross the 2-lane road, stay in a safe zone and cross the other 2-lane road when it is safe to do so. For travellers with disability, the ADA (2006) recommends that, the pedestrian island should be in a dip and of the same level as the adjoining road since this would easily guarantee easy crossing for wheelchair users. Also, the width of the traffic island should be wide enough to accommodate at least a wheelchair user and a non-wheelchair user.

The only 4-lane road on campus is the one connecting the University East Gate to the Science Faculty at the North Campus. In using the crossing points, only two of such pedestrian islands were observed on campus. The first

pedestrian island was the one adjacent the Main Library as seen in Figure 14. This island has a width of 900 millimetres which is enough to accommodate a wheelchair user and at least two other persons without any form of disability. Another observed feature is the presence of drop kerbs on both sides of the pavement leading to the traffic island as well as the dip in which the island lies. This dip was almost on the same level as the road hence wheelchair users in particular would easily join the traffic island when moving from one end of the pavement to the other.

Figure 14: Traffic island at crossing point beside the Main Library

Source: Fieldwork, 2016

The other island as seen in Figure 15 is closer to the Science Faculty and for wheelchair users in particular, this island is the least accessible. It has no zebra crossing linked to the sidewalk. There are no drop kerbs along the sidewalks though the curb is about 130 millimetres and the traffic island is on the same level as the pavement on that route. These conditions make it extremely difficult for the wheelchair users to access the island given its height of about 135 millimetres. The situation makes it difficult for wheelchair users to transit from one side of the road to the other. Any wheelchair user who insists

to use this route would have to opt for the extreme end of the sidewalk where there is no island to cross. This decision endangers the student with disability since he or she will be required to cross the four lanes at the same time or be at the mercy of a driver who may stop for him or her to cross the street. If the student decides to abandon the options offered, he or she would have to look for an alternative route to undertake the trip.

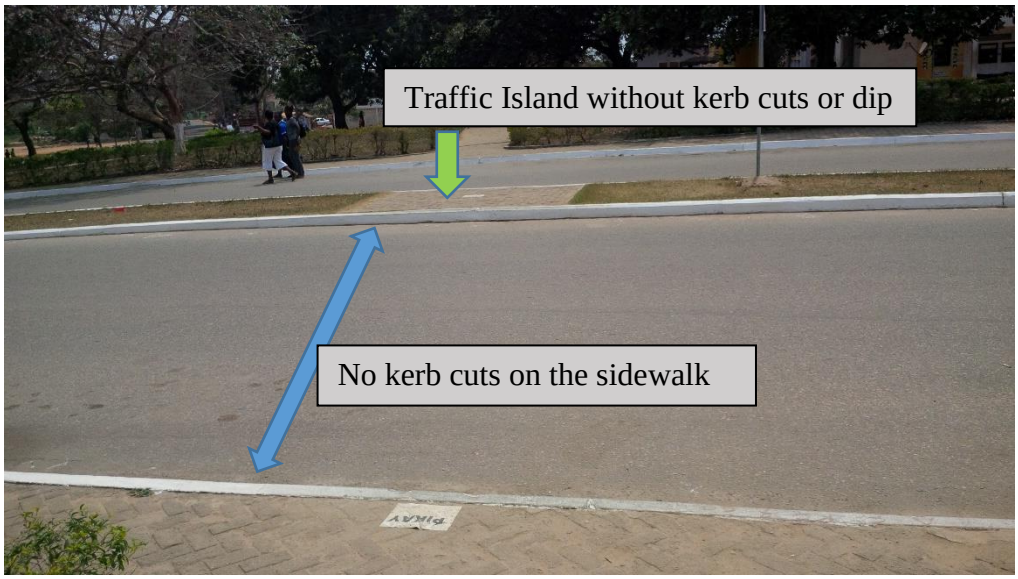


Figure 15: Traffic Island without zebra crossing and drop kerbs when approaching the Science Faculty.

Source: Fieldwork, 2016.

Another crossing aid is the presence of traffic calming measures. These are intended to reduce the speed of moving traffic especially when approaching controlled crossing points. For persons with physical disability who are considered by Adjei (2010) to be slow to react to danger, traffic calming tools like speed bumps and rumble strips should always precede controlled crossing points as this would give the driver ample time to reduce speed and take any necessary decision while approaching the controlled crossing point.

Although the presence of speed humps and ramble strips aid in reducing vehicle speed, augmenting it with a zebra crossing is the most ideal practice when pedestrian safety becomes the issue of interest. On all sides of the 4-lane junctions, only two out of the 12 roads (4 links on every 4-way junction) on these junctions had both ramble strip or speed ramps and a zebra crossing. These sites can be found on the route from the FELT junction to the SRC hostel and the route from the shuttle station at the New Site towards the East Gate. In these two cases, the distance between them were more than 20 metres. This distance confirms the recommendations by North Ireland Department of Transport (2007) that a minimum distance of 10 metres is enough to make drivers reduce their speed to the barest minimum while approaching the crossing point. To make crossing decisions easier for students with low vision, the speed humps and the zebra crossing should be painted with contrasting colours and maintained at regular times to avoid fading (UNDP, 2010). Observations from the field proved different as most road bumps had faded colours with little or no colours showing on some speed humps as seen in Figure 16.

Another phenomenon observed in the field was the position of the ramble strip in relation to the zebra crossing at the Main Library. At this point, the zebra crossing preceded the ramble strip, which contradicted the UNDP (2010) recommendation for a safe crossing. If the ramble strip was meant to reduce the speed of vehicles when approaching the crossing point as seen in Figure 17, placing the zebra crossing before the ramble strip reduces the safety of students with disability and also increases the risk of accident especially when there was no signage at that crossing point. These scenarios are shown in Figures 16 and 17.

Figure 16: Speed bump before the crossing point, towards SRC hostel

(Recommended situation)

Source: Fieldwork, 2016

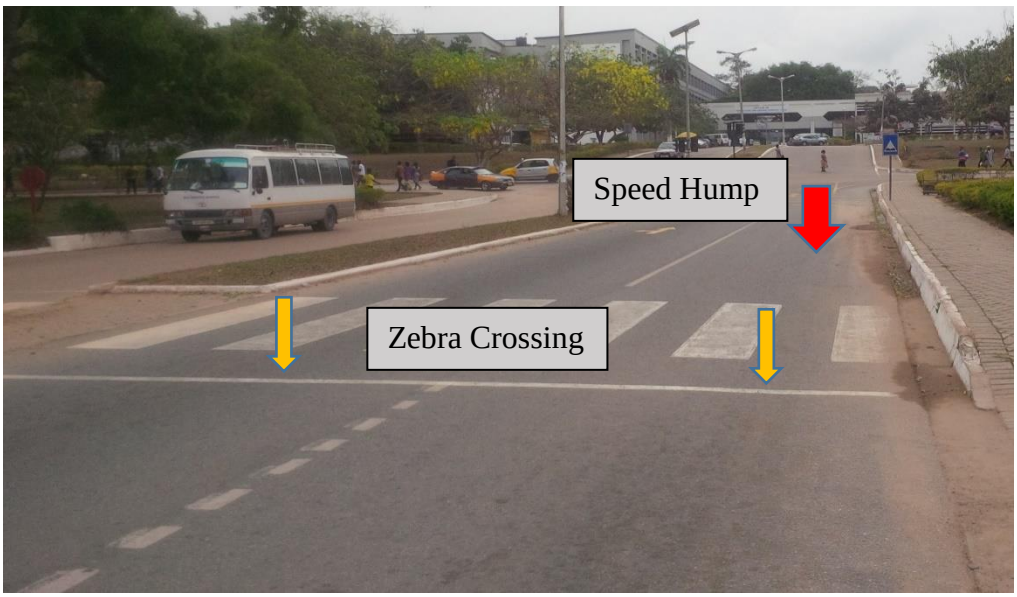


Figure 17: Crossing point before ramble strip, beside the Main Library

Source: Fieldwork, 2016.

Traffic signal

In order to ensure the safety of students with disability at crossing points, the traffic light is one important tool that can be used to fully control both vehicle and pedestrian movement at the same time. While section 23 of the Person with Disability Act (2006) mandates all drivers to give travellers with disability the right of way if they exhibit the intention of crossing the road, it has been the case that most drivers do not observe this directive (Addo, 2012). To avert this, a traffic light would give pedestrians their right of way on a regular interval. Though traffic lights have been installed on all 4-way junctions on campus, the presence of traffic lights are not enough to aid the visually impaired in attaining autonomy when crossing the road since these group of students cannot tell if the light is green or red. Frye (2013) identify the use of the ears in detecting moving objects. This opinion was given credence by the ADA (1990), UNDP (2010) and Venter (2011) as one of the unconventional approaches to use when crossing aids are not available. Since using the ears to detect moving vehicles involves the prompt attention to the sound of the vehicle, any other source of sound at the time of making crossing decisions may impair the ability of visually impaired students to make good decisions.

In relation to the present situation on UCC campus where the pedestrians only rely on the use of the colours of the traffic light, the autonomy of visually impaired students is not guaranteed. The recommendation of the UNDP (2010) for the provision of a push button that would allow visually impaired persons to control the traffic light when they get to the crossing point is yet to be a reality in the UCC. Also, the recommendation to install audio devices that transmit

distinct audio signals to aid visually impaired students in crossing the road (ADA, 1990) is presently a dream.

As seen in Figure 18, no traffic lights on campus had push bells or any form of assistive traffic control devices that would allow students with disability to control vehicular flow. In the course of the data collection, the researcher interacted with one of the engineers who mounted the traffic light. In the engineer's remarks, the crossing needs of students with disability was not factored into the mounting of the traffic lights since his contract did not include the provision of push buttons and audible signal transmitters. He acknowledged the need for these push buttons but cited the tendency for students without disability to misuse it and the risk of being vandalised by students.

To compensate for the absence of the push bells, the engineer revealed that, the red phase of the traffic light, which controls vehicle flow, can hold for 30 to 50 seconds and this depends on the time of the day and the event on campus. The engineer further revealed that, since his contract did not include the installation of audio transmitters, he could not comment on that, though he considers it relevant for the students with disability. Upon visiting the different traffic lights at different times of the day with a stopwatch, the study revealed that the timing of the red phase of the traffic light was truly in line with the assertion of the engineer. In the morning, the red phase stood for 45 to 50 seconds but during the evenings, the red phase stood for 30 to 40 seconds. This revelation further supports the assertion of the UNDP (2010) who pegged the minimum holding time for red phase at a minimum of 12 seconds and this should be enough to allow such disabled commuters to cross a 2-way street. Figure 18 shows traffic lights at various segments on campus.

Figure 18: Traffic lights without push bells and audio transmitters close to the 4-way junction adjacent Zenith Bank.

Source: Fieldwork, 2016.

When students with visual impairment were asked of the ease in using the traffic light, a Level 300 visually impaired male student at the New Site revealed that:

> *It is not easy. For instance, when I am using the road, I don't know if the light is red or green. So last week for instance, I got there and unknowing to me, the vehicles had been shown the green light. So when I was crossing the road, somebody quickly had to run towards me and aided me to cross the road to the left side of the pavement. The traffic light is helping us though but we (the visually impaired) cannot know when it is green or red.*

Part Two: Extent of usage of university shuttles by students with disability.

This section discusses the findings on passengers' environment and the extent to which these facilities influence disabled students' usage of campus shuttles. In this light, the study examined the presence, condition and number of selected disability friendly facilities in shuttles on campus. The findings were then compared to the UNDP (2010), DFID (2004) and the Persons with Disability Act (Act 715) recommendations on what a universal transport services should look like. The issues under discussion were based on facilities like the floor height of the shuttles, width of entrance, presence of priority seats or designated areas, assistive technology, driver's behaviour and fare policy existing on campus.

Floor height and boarding platform

The floor height of a vehicle describes the distance between the ground on which the vehicle stands and the first level of access to the vehicle. This difference greatly influences the extent to which students with physical disability, pregnant women and children can make use of a public transport service. In all, 18 shuttles were examined and the floor height of these vehicles ranged from 320 to 520 millimetres (Figure 19). These measurements contravene the assertions of Frye (2013) who recommended a maximum floor height of 230 millimetres if the travel needs of commuters with disability are factored into. In Frye's (2013) account, the nature of the roads in developing countries with respect to features like long speed humps and potholes influences developing countries to opt for high floor vehicles since they come with relatively less cost of maintenance.

Though most vehicles had floor height above 230 millimetres, none of the visually impaired students interviewed considered it a challenge. On this note, some visually impaired cited the use of equally high floor vehicles when they patronise buses outside campus while others identified the use of the white cane as an aid in boarding the shuttles. To them, the white cane acts as an indicator to identify the first step of the shuttles and once this height is known, necessary steps are taken to board the shuttles.

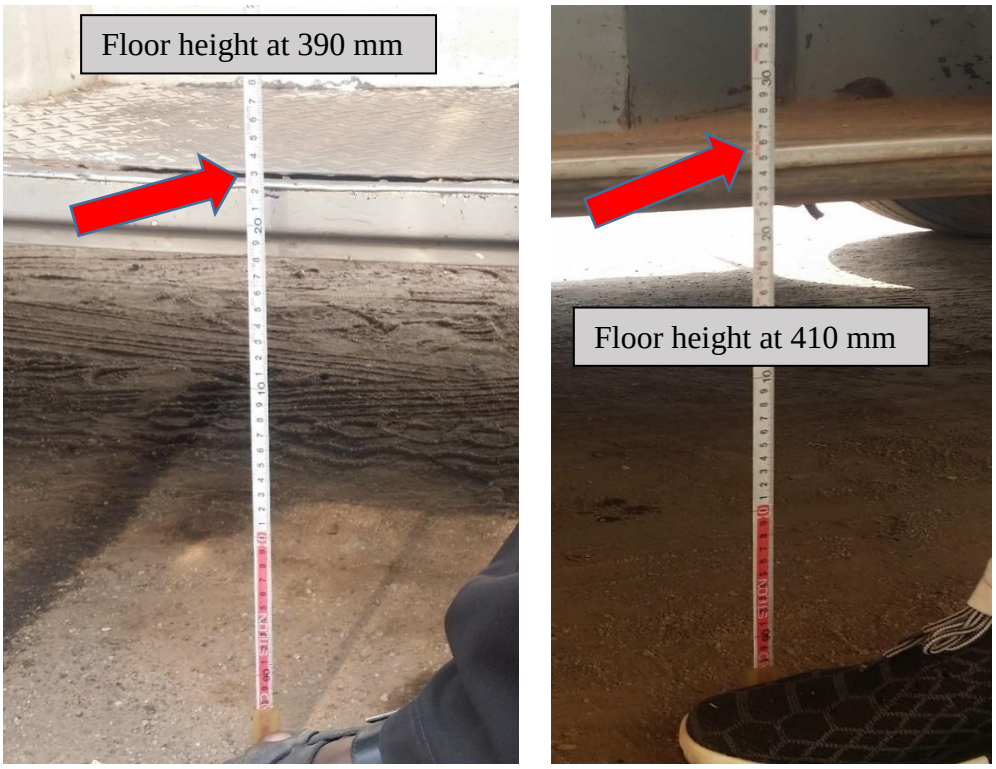


Figure 19: Floor heights of shuttles.

Source: Fieldwork, 2016.

Aside having a maximum floor height of about 230 millimetres, boarding the vehicles might still present some challenges for wheelchair users. To reduce the difficulty in boarding shuttles on campus, a boarding platform is needed to assist both disabled and non-disabled users. This would reduce the time taken to board the bus as it makes it easier for disabled students by reducing the number of steps needed to join or alight from the shuttle. During the time of

this study, 18 buses were boarded from the New Site to the Old site and no form of boarding platform was observed. The absence of this facility contravenes the UNDP (2010) recommendation for an accessible transport service. These platforms could take the form of an inclined plane for wheelchair users or a raised platform that will assist non-wheelchair users to easily aboard the shuttle.

This is the account of the only wheelchair user on campus; a Level 100 male student resident at the New Site:

> *When I am entering the shuttle, I have to fold my wheelchair. Sometimes I have to hold the entrance of the shuttle and drag myself into the bus and at other times, I crawl to the seat. I have not seen any platform where I can use the wheelchair on.*

The absence of these boarding platforms as seen in Figure 20 has been one of the many reasons why this wheelchair user has only used the shuttle once since he entered the University in August 2015. This respondent relies on taxis' which have a relatively shorter floor height, occupies four passengers and also has a boot where the wheelchair can easily be placed when folded.

Figure 20: Campus shuttles with no boarding platform.

Source: Fieldwork, 2016.

Priority space or designated areas

Meeting the transport needs of persons with disability also includes the provision of exclusive facilities like priority seats for visually impaired and designated areas for wheelchair users. In examining all 18 shuttles on campus, the study found that none of these buses had designated space for wheelchairs and no priority seats for the visually impaired. If the wheelchair user wants to board the bus, he or she would have to do so without being in the wheelchair. Here, non-disabled persons assist the wheelchair user to move into the bus and the wheelchair would have to be folded before it can find a place on the bus. The absence of the wheelchair space contravenes the recommendation of the UNDP (2010), which called for the inclusion of such space in buses. It should be noted that none of these buses had a ramp and there was no clear way at the entrance that would even allow the wheelchair users to join the shuttle while seated in the wheelchair.

During the study, the researcher interacted with some drivers on why their vehicles did not have space for wheelchair users. Some drivers of low occupancy vehicles like the '*Urvan'* and '*Ford'* remarked that, replacing the existing seats with space for wheelchair users was not economically viable since there were very few wheelchair users on campus. To this effect, replacing the seats would translate to loss of income especially as the University has decided to make shuttle services free for all students with disability on campus including wheelchair users. Secondly, the ceiling of these buses were measured and it was realised that the ceiling was less than 1.8 metres from the floor of the vehicle making it difficult for people to stand at these designated space if no wheelchair user joined the shuttle before it left the station. With medical factors accounting

for the most dominant cause of disability, anybody can fall in this group hence, calls by the Persons with Disability Act (2006) for the inclusion of such priority seats or space in all buses.

With reference to priority seats, no signage or inscription to this effect was seen on any of the shuttles and as a result non-disabled and disabled student at anywhere they preferred. On one of the trips, the researcher witnessed a visually impaired student who sat four seats away from the driver while a non-disabled student was seated directly behind the driver. Such a condition contravenes section 29 of the Persons with disability Act (2006), which strictly mandates commercial vehicle operators to reserve at least two seats for persons with disabilities which should be clearly labelled. According to this act, these seats should only be occupied by non-disabled commuters when a disabled person has not occupied any of the seats as at the time of starting a journey.

In addition to the above, the UNDP (2010) recommends that these priority seats should be located directly behind the driver's seat or close to the entrance, but such provision was not seen in the University of Cape Coast, as such all the seats were free to be used by students without any form of disability. From observation, it was realised that none of the buses had a priority signage or sign that would prompt non-disabled student to avoid those seats unless the bus is about to leave while the priority seats were still vacant. Though the buses had no disability sign, the drivers also did little to reserve specific seats for these groups of students. During the time of the study, no driver asked any non-disabled student to vacate his or her seat for any visually impaired and when participants were asked if a driver had asked someone to vacate his or her seat for him or her (the visually impaired), only 6 out of the 27 participants' account

was in the affirmative. When asked on where they sit when they join the shuttle, a Level 400 female visually impaired student at the Old site revealed that:

> *Anywhere, it could be in front, sometimes at the back. We don't have a specific place. When you board the car and your sighted colleagues are seated in front, some of them may vacate their seats and let you sit down, others too would not care about you at all. In this case, I have to look for any available seat other than the one closer to the entrance of the shuttle. Oh! at the back of the shuttle too, I have been sitting there and even last week I sat at the back. If the car is not full and the front seat is vacant, we sit in front but if those seats are occupied, we have to go to the back.*

When asked if any driver had asked non-disabled students to vacate their seats, this respondent added that:

> *Yes! They always say 'Oh please, let your friend (referring to visually impaired student) sit here'. And for some of them too (the sighted colleagues), when they see you, they just vacate their seats for you.*

From the study, participants were only able to mention the names of drivers of the University shuttle who constituted three out of the 18 drivers whose vehicles were examined for the study.

A Level 200 visually impaired male student also shared his experience on where he normally sits in the shuttle. According to him;

> *Anywhere! If I enter the shuttle and the seats in front are occupied, I am directed to the seats at the back of the shuttle. Depending on the situation, I either sit on the seats directly behind the driver, in*

the middle seats or on the seats at the back of the shuttles and sometimes too, I sit on the seat beside the driver.

When asked if the drivers instruct students to vacate their seats for them, this respondent revealed that:

No, except my friends. If I meet a friend on my way to the shuttle station, they are the ones who sometimes ask non-disabled students already seated in the shuttle to vacate their seats from me.

Assistive technology

Communication plays a key role in allowing persons with disability to relay their intentions to the driver of a bus. This could take the form of informing the driver of where one would alight or relaying any other detail that may be necessary at a point in time. In all 18 buses examined, communicative tools like push bells, audio transmitters and smart screens were not seen in any of the buses on campus. In Frye's (2013) view, the absence of these facilities increases disabled travellers' dependency on the non-disabled which reflects society's poor knowledge on the transport needs of travellers with disability. In an attempt to attain some level of autonomy in movement, travellers with disability may resort to walking or using the pedestrian sidewalk though it also has its own challenges. The absence of these facilities as seen in Figure 21 contravenes Litman's (2015) principles on universal transport system which cites factors like independence in usage and use of less physical effort as some of the key factors that characterise the movement of all persons including travellers with disability.

Though Maljotra (2010) cites the provision of these facilities in exiting vehicles as increasing drivers cost of operation, Frye (2013) calls for the use of simple facilities like the driver calling out the names of various stop points since this would give the visually impaired and strangers a fair idea of where they have reached. Drivers calling out of the various stop spots would be the yardstick for travellers with disability to make proper travel decisions but Yong (2010) cites the unsustainable nature of this approach. To him, it would require the drivers to shout at regular intervals throughout the journey and in view of that, there will be the tendency of forgetfulness or tiredness which will eventually limit the driver's performance.

In an interaction with some shuttle drivers on why their shuttles did not have these facilities, some drivers made it clear that visually impaired students who board their shuttles can easily draw their attention by asking someone close by to do that for them. To these drivers, this act was enough to prompt them to stop at a desired destination. Aside having to rely on other commuters, other shuttle drivers also revealed that both students with and without disability stop at common areas, and these stops are mostly prompted by the non-disabled students. In prompting the drivers, the visually impaired students also use this opportunity to have a sense of where they are and also make other travelling decisions like when and where to alight.

The above narration by the drivers still points to the fact that, students with disability are dependent on students without any form of disability and this plays down the principle of independence in usage as postulated by Ventor (2011) and Olufemi (2007). Though these communication gadgets come in various degrees of sophistication and cost, there are simple ones like the push

bells that transmit audible notes which prompt drivers to stop. The use of this technology would spare disabled students from shouting or having to prompt the driver through a proxy.

In recounting the experience of disabled students on how they make their intensions clear to the driver, a Level 300 visually impaired male student revealed that:

> *God being so good, whenever I join the shuttle. I always know where I would alight but before I know it, someone else in the shuttle had already prompted the driver since he or she would also alight at the destination I have in mind. So immediately the vehicle stops, I also alight. On campus, people usually prompt the driver when we are getting closer to an intended stop point so it easier to anticipate and take necessary actions.*

When asked if the drivers call out the various stop points, the respondent further stated that:

> *Some drivers do call out the names of some stop points especially when the bus is coming from the Old site to the New site. The driver would ask if any passenger would alight at Valco. This does not happen at only Valco per se. Some call out other stop points like Casely Hayford Hall (CASFORD), Café Roof Top (CRT), SSNIT or FELT junction. Some drivers call out all these stop points before they finally end up at the shuttle station at the New Site.*

With reference to calling out the names of the various stop points, the respondent revealed that nothing was heard when the shuttle commutes from the New Site to the Old site but in reverse very few drivers call out the identified

stop points since the route to the New Site has two distinct paths and cannot assume if students would want to alight at the Junction at Valco or move to the bus-stop through Graduate hostel.

Figure 21: The interior of a school shuttle without any assistive communication tool.

Source: Fieldwork, 2016.

Driver behaviour

Even if some modifications like the provision of priority seats, assistive technology, and boarding platforms are made on existing shuttles, these would not translate to an increase in user rate if driver behaviour does not permit students with disability to enjoy transport services as compared to students without any form of disability. In commuting via 18 different shuttles, observations from the shuttles revealed that drivers had the patience to wait for students with various degrees of disability to alight from the bus before they took off. When it came to a visually impaired student, the drivers patiently waited for these students and though it took a little longer for them to do so, other passengers did not make any complain about it and even if they did, their

complaint was not loud enough for me to hear. Aside stopping for passengers to join or alight from the shuttle, the study also observed that the drivers did not suddenly apply their brakes since it had the tendency to cause injury to passengers who may fall as a result of that.

In an interaction with some drivers, it emerged that, their decision to wait for students to fully alight from the shuttles stems from their wish to prevent any injury associated with students falling from a moving shuttle. In an informal session with the Transport Officer of the University of Cape Coast, he revealed that, the University transport policy had just been approved by the University's Council and was in print at the time of this study so UCC had no functional transport policy. He further indicated that, most of their activities in the past and at the time of the study were guided by locally formulated code of conduct and 'common sense'. By this, drivers are expected to stop for passengers with all degree of disability to board or alight before taking off. The above attitude of drivers on campus conforms to European Conference of Ministers of Transport (1991) recommendation on a Universal transport services since it offers disabled travellers some level of relief knowing very well that their safety is of paramount concern to the drivers.

While observations showed that stopping and alighting were positive, disabled students' response to drivers' friendliness, when joining the shuttles at the shuttle stations was not in the same light. The unfriendly behaviour of some shuttle drivers especially drivers of privately owned buses was attributed to the University's convention to exempt these group of students from paying shuttle fares though the University Disability Policy and the Students' handbook does not mention this convention. In the account of these students, the exemption in

the payment of the shuttle fares has made them unattractive to most drivers hence their frustration in accessing these shuttles on campus. Further interactions with the visually impaired on how they differentiate the University shuttles from the privately owned operated shuttles revealed that, the basis for this differentiation was on their perceived size of the shuttle. In most cases, the University shuttles to the Old or New site comprises the 'Coaster' or the 'Tata' which were shuttles with high occupancy. In this light, smaller shuttles were deemed privately owned. Though this approach was being used by the visually impaired, the method does not provide an accurate distinction since one private shuttle operator uses a high occupancy shuttle.

As mentioned earlier, the hostility in driver's behaviour can be traced to the University's decision to exempt students with disability from paying fares for shuttles. Page 9 of UCC's Policy for the Provision of Disability Services cites the provision of shuttle services for persons with disability and even with that, this provision was only limited to the staff of the University. Apart from this, the policy also fails to explicitly state if the services should be enjoyed for free. Even if the shuttles are to be enjoyed for free, the policy also fails to state the number of students who can enjoy these services on a particular bus since these drivers were cited to limit the number of visually impaired students who joined their shuttles to 1 or 2. Aside the Policy for the Provision of Disability Services, the student's handbook is also silent on the usage of shuttle by students with disability.

With the gap in information, all students interviewed in this study identified conductor's attitude at the station as a major barrier to their movement. This ranges from physical obstruction of these students from joining

the shuttles, the use of derogatory comments by drivers and the absence of support like reserving seats or even assisting students with disability to join the bus. The degree of hostility on a student increases when a particular student is known to have boarded a particular shuttle for more than once in a day or when more than one or two disabled students are joining a particular shuttle. When asked to rate driver's level of friendliness and give reasons to support the claim, a Level 300 visually impaired respondent revealed that:

> *I will score them 3 out of 10, and even with that score I have been lenient. The shuttle drivers are not doing well. I fear God and if it were not for God, I would have given them 1 because they don't do well at all. Sometimes, when you get to the shuttles and you are not careful, the shuttle driver will even ask you to come down. They claim the shuttles that we board on campus are for individuals especially the lecturers and because we don't pay the 60 pesewas when we get in, the shuttle drivers become so angry when they see you. They do all this simply because of the 60 or 50 pesewas. Some of us had to pay for the shuttles even before we get in. I remember that there was a time when I was going from the hall to the North Campus (Science). I was with this brother (pointing to a third person in the room as at the time of the interview), we got to the Zenith bank and at that time, we didn't even need the shuttle but one of the shuttle drivers just asked us to come. But most drivers too, they will simply not give you any attention with regards to boarding the shuttles or even asking someone to vacate their seat for me to sit. I remember a time that we were returning from a*

lecture to the hall and when we got to the shuttle station, there were 2 visually impaired students who were already seated in the bus. I was the third visually impaired student to join that shuttle and the driver told me: 'the car was full, I own the car and I said it is full' so he didn't allow me to join. My friends with me asked him why he allowed 2 other visually impaired to join the bus but was refusing me entry. The driver didn't even bother to reply and took off after he had taken his fares from those he allowed to join the shuttle.

While revealing the respondent's experiences with campus drivers, none of these visually impaired students was able to mention the name of at least one driver who had ever been hostile to them. In the opposite direction, some participants also shared memories of campus shuttle drivers who have been friendly to them and the basis for this friendliness covered the politeness in speech, assistance in identifying the right shuttle as well as assistance in finding a suitable place to sit. With reference to names, the only name that was mentioned by all participants was 'Shatter' who is said to be a driver of a University shuttle. Other names mentioned were 'Virgin Brown' and 'Pastor Chris'. If these names have found their way into the lips of the visually impaired, one would only conclude that the services they rendered go beyond what other drivers offered them. In citing reasons why these drivers were considered the friendliest, a partially sighted student revealed that:

I will say that some of the drivers are friendly. When I get there, they find me a place to sit and they do not deceive me that it is full when indeed it is not full. Shatter is very friendly and so is Virgin

Brown. These people are friendly but these are the names that I can remember. There is one man, I know him but I don't know his name, he drives a white Urvan (it's not all that white but should I call it white?). He is a short man and a little bit advanced in age that is, he is not that young. He is very good and he is very respectful. I don't know his name and it is unfortunate.

Though participants shared their experience with friendly and hostile drivers, most of these students were of the opinion that, these drivers, especially the drivers of privately owned shuttles were more hostile to them than those employed directly by the University.

Part Three: Role of stakeholders

This section presents the findings on the role of key stakeholders in the University of Cape Coast in providing accessible transport facilities for students with physical disability. The data here were obtained from the Transport Officer, Head of Projects at the Directorate of Physical Development and Estate Management and a representative from the Office of the Dean of Students of the University of Cape Coast. The study examines contributions of these officers since the transport needs of students fall within their scheme of work.

Transport Officer

With reference to the passenger environment, the Transport Officer plays a major role, since his outfit provides drivers and shuttles for students' usage and also regulates the activities of all drivers who operate shuttles on campus. It was observed that not all shuttles and its associated drivers were

provided by the University. According to the Transport Officer, privately owned shuttles have been given the permission to operate since the University cannot keep up with increasing student need for shuttle services, given the frequent breakdown of the University's shuttles and increasing student population.

As a member of the shuttle committee, the Transport Officer further revealed that the shuttles committee is currently an ad hoc committee without any official documents that regulate and offer a framework within which all shuttles should operate. Secondly, the Transport Officer revealed that, the transport policy of UCC was not in operation since the policy had been at the printing press for some time. Hence all management practices adopted to regulate the shuttles and their operators are based on conventional practices and 'common sense'. When asked of his knowledge of an existing intervention (documented or otherwise) that sought to aid the mobility of students with physical disability, the Transport Officer claimed that:

> *Yes! Generally, there is. It is a convention and it is not documented but drivers of the University shuttle service are encouraged to make provision for people with disability without taking any form of remuneration like fares. That is, they (the students with disability) don't pay anything when they board the shuttle. There are private shuttle buses so what we have put in place is that, when you (the private shuttle operators) pick up a disabled student, you will be given a card (reward) as an incentive.*

Having realised the above, the absence of a clearly stated policy created the opportunity for drivers of privately owned shuttles in particular to deny these students from enjoying the shuttles for free. This situation raises concern on the

level of information or training that is available to these drivers once they decide to operate on campus, especially when it comes to meeting the travel needs of students with disability. In the concluding sentence of the Transport Officer, the card or reward cited in his account was expected to be a form of incentive that would reduce the quarterly payment made to the University authorities as rent or fees for using its space for business. In an interaction with some drivers of the privately-owned shuttles, none of them had any knowledge of such an incentive package as mentioned by the Transport Officer.

Assessing drivers' knowledge of the travel needs of students with physical disability can be evaluated by examining the content of information available to these drivers and the channel through which this information is made available. Of course, the sources of such information would be the Transport Officer, a representative of the shuttles committee or the Office of the Dean of Students. With drivers' proximity to the Transport Officer, the study sought to find out if any training programme had been designed for these drivers and even if there is such a programme and its content was also a subject of interest to the study. In response to this question, the Transport Officer remarked that;

> *Presently, there is no training. We have so far organised 2 or 3 interactions with the drivers and that's some time ago. We fully brought in the private shuttle operators about 2 years ago. You know, this is a young Union that is coming up and there are new buses that come in all the time. As and when they come in, they might be ignorant about some of these things since we may not have forgotten to tell them about such conventions. Before any driver*

operates a shuttle on campus, we have to certify him or her and this will require the potential operator to meet some criteria. These include inspecting the buses to see if they are in good condition, making sure that the documents of the vehicles are valid and also insisting that the drivers possess valid licence and also in good health. They (drivers of privately owned shuttles) pay whatever they are supposed to pay and then they take their tickets from the University. Maybe, the period within which these new ones come in is so short that some of these things might not be known to them. That's why I said that this is a human institution and there are a lot of things involved. Even when he knows of this information, sometimes they try to beat around and make their own ways. How much is 60 pesewas that, somebody would insist that he takes the 60 pesewas without considering the benefits that he would accrue when he gives those considerations. In the meetings I mentioned earlier, issues discussed ranged from the general welfare of drivers, good driving skills and others.

This narrative of the Transport Officer brings out two key issues. There no mandatory and scheduled training sessions for all drivers of privately owned shuttles, once they satisfy all requirements to operate on campus. It is under these training sessions that issues like the needs of students with disability would be made known. The absence of these mandatory sessions leaves students with disability at the mercies of these shuttle drivers, especially when it comes to enjoying free transport service and offering other support services like

assisting these students to board, alight and even walking them to their destination if possible.

As revealed in the study, the drivers of privately owned shuttles in particular ended up obstructing these students from joining their shuttles knowing very well that free usage by students would translate to a loss of revenue for them. It was no surprise that all the friendly drivers mentioned in the study by students with disability were all drivers of University owned shuttles. These drivers of the University account for their daily sales to the University hence a loss of revenue as a result of offering free services to some students with disability would not be considered a problem since it is the University's intention to make the shuttle services free for this group of students.

The second issue from the narrative was about the requirements for private individuals to operate a shuttle on campus. The account of the Transport Officer suggests that, once the driver is able to provide a vehicle in good condition, possess a valid driver's license and pays a fee to the University, all conditions are satisfied. However, one would ask if the student with disability had a place in these criteria as the Persons with Disability Act (2006) requires all transport operators to include disabled travellers in the planning and operation of transport services. This is particularly important because issues like the height of the shuttle, designation and labelling of a priority seats, availability of a raised platform and the presence of assistive technology were not mentioned in the Transport Officer's account. Even if the Transport section would want to include a requirement for disabled students when examining potential shuttle operator, there is no document that would bind operators of

these shuttles to conform to these regulations. In Danso & Ayarkwa (2004) view, the absence of documents that stipulate disability related provisions in schools and other public institutions reflect the institutions' poor knowledge or recognition for the travel needs of such groups of road users.

Inferring from the Transport Officers' account, the absence of a Transport Policy and standard working principles for the shuttles committee resulted in the usage of conventional practice and 'common sense'. Among these conventional practices were the free ridership offered to students with physical disability. The implementation of these conventions come with some challenges since these conventions fail to address a number of issues. Principal amongst them is the convention's failure to stipulate the number of disabled students that can enjoy free transport services on a particular bus at a time. When asked if there is a convention (documented or implied) that limits the number of disabled students who can enjoy free shuttles at a time, the Transport Officer responded that:

> *No! We do not have any convention like that. This is a development that you have brought up. Sometimes when we are drawing up polices and issues like this come up, we don't think of it happening that often. That is, we don't think that a group of people at a particular time will get into a situation where they all have to board a particular shuttle. This is a 1-in-10 situation and in fact, we have not captured that in our deliberation so with this coming up, we will meet and see how best we can work around it when such situations come up.*

Though the Transport Officer considered this as a 1-in-10 case, suggesting that the likelihood of this occurring was very negligible, the account of all 27 students with disability proved otherwise. Almost all students interviewed had experienced this phenomenon at one point or the other. The study further revealed that, as at the time of drafting the University's transport policy which was about two years ago, the University was the only provider of shuttle services hence the likelihood of this occurring was negligible. With privately owned shuttles overtaking the shuttles services on campus, the assumption by the Transport Officer has proven to be inaccurate since these drivers have been identified to restrict the number of disable students who can enjoy free services on a particular bus to only 1 or 2. A review of the yet to be printed Transport policy revealed that, the policy did not even make use of the word 'disability' in any part of the policy and even with the current disability policy of UCC, transport provision in this policy was for staff with disability and not students. An extract from the policy reveals that;

> *The staff or faculty member may request on-campus mobility assistance (shuttle service) to and from college courses and related educational activities.*

In addition to the above, the present conventional practices do not even include the reservation of priority seats for the visually impaired and designated areas for the wheelchair as key factors to consider when examining potential shuttle operators. This omission is directly in contravention with section 29 of the Persons with Disability Act (2006) of Ghana which requires transport operators to make provision for these facilities.

With 31 visually impaired students at both the New site and Old site, equipping existing shuttles with assistive gadgets like push bells or audio systems shuttles was also recommended by the UNDP (2010) since these would easily allow commuters to declare their intention to alight at their destination and also be aware of where they get to while journeying on campus. While all buses observed on campus did not have any form of assistive gadgets on any shuttles, the yet to be released transport policy does not even address this issue as well. Having mentioned the above, the study sought to find the University's position on the provision of these gadgets since the ADA (2006) and UNDP (2010) strongly recommends it. In the words of the Transport Officer on whether this has been considered in his scheme of work, he revealed that;

> *It has not been factored. It is at the driver's discretion to call out the various stop points if he wants to know whether a passenger would want to alight at a destination. So once it has come up, we will consider it. We are growing, so as these things come up, we incorporate it in our scheme of operation and make sure that the drivers are made aware that these things are needed so they will announce the next stop. Maybe somebody is on board and asleep, so announcing where you are and where you will be going next may alert the person who is sleeping to be aware and come out of his slumber. So, we will incorporate it into our scheme of operation to ensure that we are heard.*

From the above narrative, the Transport Officer opted for drivers to call out the names of the various stop points and in Majlots (2010) view, this is the cheapest option available since it only requires drivers to call out the names of

every stop point. The UNDP (2010) added that, the driver's ability to call out the various stop points may be impaired by factors like forgetfulness and/or tiredness while driving hence visually impaired students may still be dependent on non-disabled students. Having identified these distractions to the drivers, students travel decisions have to be augmented with vigilance since a driver is likely to skip a stop point even when these stop points are made known to him before the start of the trip.

In the acquisition of the buses to be used as shuttles or used by the various departments, the Transport Officer revealed that his knowledge is sought before the final decisions on what bus to purchase is made. In his account, the factors that are considered before the acquisition of buses include the expected number of people to use the shuttle, the distance to be covered and the frequency of usage. According to the Transport Officer, there is no regulation in the procurement process that requires buyers to acquire disability friendly buses as enshrined in section 23 of the Persons with disability policy and in the words of the Transport Officer;

> *In the University when we are acquiring a bus, we belittle persons with disability. The departments acquire vehicles through procurement so they will tell you; 'we have this programme, the programme is scattered around this part of the country, the number of people for the program is this' and with these specifications, I advise them on the most suitable vehicle that will meet their needs. They have not factored the disabled. I have not seen in any vehicle acquisition form where the user department has mentioned people with disability. So generally they are not factored, they are not.*

From the outside, we will talk as if we care but when it comes to looking for facilities to use, we don't factor the usage of persons with disability.

The absence of any consideration for the usage of the University buses by students with physical disability on campus paints a gloomy picture of the University's readiness to integrate the mobility needs of these students. Such an omission calls for a review of the planning and integration of the travel needs of disabled travellers in all transport activities.

The Head of Projects, Directorate of physical development and estate management

This section discusses the stakeholder's role in providing an accessible pedestrian environment for both students with and without any form of disability. In the pursuit of universal access, the University in its disability policy had declared its decision to institute an Environmental Access Plan and Timeline intended to develop new structures or modify existing physical infrastructure as a way of making campus physically accessible to all persons with disability. These include the provision of ramps, curb cuts, improved lightening system and the construction of wider sidewalks as well as the expansion and rehabilitation of the existing ones. Of course, this intention is directly in line with Sections 23 to 30 Persons with Disability Act 516, the UNDP (2010) and the ADA (2006) all of which call for accessible transport design for commuters with disability.

At present, existing facilities on campus show how little this policy has been implemented since the current physical environment does not fully ensure

the free movement of students with physical disability. It must be noted that, some progress has been witnessed and this is with reference to access to public facilities like the provision of entrance ramps at the Faculty of Education Lecture Theatre as well as presence of a functional elevator at the Centre of Distance Education. For the walking environment, however, very little has been accomplished.

When asked of the specific contribution of the Directorate of Physical Development to the walking environment of students with physical disability, the Head of Projects responded as follows:

> *You know, the University is a bit old and it is one of the premier Universities so some of the designs in terms of the access, roads and everything had already been laid out as at the time the University was built. What we are trying to do now is modify and expand existing facilities and this has been done in most areas of the school. We try as much as possible to provide adequate walkway. If you take the Sasakawa road, there is a walkway with curbs for people with wheelchair to access it when they have to negotiate the curve. Taking the Sasakawa road again, we have tried to improve the condition of the walking environment knowing that, that place is a heavily populated area which is used by persons with and without any form of disability. So what we have done is to introduce ramps. So if you look at the roads, there is a whole lot of ramps which is also an inconvenience to motorist but I think it is with that consciousness that we provided those ramps. If you go to some areas, even though the visually impaired might*

not see, we have provided some zebra crossing for people to cross. Construction work is being done on the Avenue road and this is done to expand the road as well as the pedestrian environment. We hope to undertake more of such expansion exercises as we go along.

Though the original plan of the University is said to have been laid long before the mobility of disabled students came into the scene, very little has been witnessed as compared to the claims of the Head of Projects. Of course, some new walkways have been constructed but the current condition of some of these walkways leaves much to be desired since obstacles and dislodged bricks have rendered some of these sidewalks unattractive to students with disability. The Head of Project cited the provision of curbs along the edge of the sidewalk to guide the movement of wheelchair users while crossing the road. However, these curbs were observed to be counterproductive to the travelling needs of these students. The UNDP (2010) rather calls for the provision of curb cuts at various crossing points since this would easily allow wheelchair users in particular to transit from the sidewalk while crossing to the other side of the road. With the presence of a curb, the change in slope at the edge of the sidewalk would be so steep and sudden and that, it creates discomfort for wheelchair users.

Another issue of concern in the Head of Projects' delivery was the provision of ramps on the road for wheelchair users. With increasing road injuries among pedestrians who share the road with vehicles, the need to separate all road users by the provision of facilities that can exclusively be used by each road user is very crucial in ensuring the safety of all. To this effect, the

Head of Projects' account of providing ramps on roads that are intended to reduce drivers speed while they also accommodate the wheelchair users on the road is clearly a contradiction to the dictates of UNDP (2010) and the Persons with Disability Act (2006). According to the above cited authorities, wheelchair users are also counted as pedestrians though their movement is aided by a wheelchair hence the need to provide a clear walkway that is well levelled and devoid of any objects.

Of course, the Sasakawa route as cited by the Head of Projects has a wider sidewalk, but the condition of the sidewalks is poor. The routes only have three curb cuts and with many discontinuities. Every end of this discontinued sidewalk should rather have a curb cut that would facilitate the movement of wheelchair users unto the sidewalk. The only three curb cuts that were observed were sited in between the junction to the SRC cafeteria and the junction to the traffic lights at FELT. In using the route from the FELT junction to CASFORD, which is the closest traditional hall as our destination, these three curb cuts only occupy about 10 percent of the entire routes which results in making the remaining proportion unattractive and discomforting, given the absence of curb cuts, the existence of path obstruction objects like dwarf walls, electric poles and pot holes on the pavement.

In guaranteeing autonomy and eventually ensuring universal access, the University had further taken some steps to introduce some facilities that would ease the burden of movement of students and staff. Principal among these is the provision of the traffic light at the various junctions. While this is laudable, it is also the case that the current traffic lights favour only the sighted, since light is the only indicator to influence travel decisions. The visually impaired become

marginalised, leaving one to question the University's commitment in attaining its Environmental Access Plan and Timeline. When the Head of Project was asked on what informed their decision to mount these traffic lights knowing very well that it had no provision for the visually impaired, he remarked:

> *You see, we have a type of traffic light that I must say was developed by the Kwame Nkrumah University of Science and Technology and that is what we are using. In fact, this is on pilot basis. I admit that we should have attached sound to the traffic lights but as I said, this is a pilot project that we are considering. And we have to improve more by incorporating sound and other things so we are working on that.*

The narrative to pilot the traffic light for only the sighted students raises issues about the University's recognition of the presence of disabled students on campus. If the pilot produces good results for the sighted students, is the University also going to conduct another pilot for the visually impaired by incorporating the audio transmitter and push buttons in the traffic lights? Even if this will be done, the Head of Projects could not give a specific timeline with reference to the duration of this pilot. In Frye (2013)'s view, street crossing in developing countries constitute one of the areas where visually impaired are most vulnerable hence their heavy dependence on other sighted commuters who can see the traffic lights and take appropriate travel decision. Frye further states that, any attempt of the visually impaired to cross such streets with the least degree of uncertainty in judgement could lead to collusion with vehicles and as such increasing the risk of accident amongst these group of road users.

The Head of Project admitted that the University's layout had been made before the mobility needs of students with disability came to light, and so some modifications to the existing infrastructure was being undertaken to make the walking environment friendly. In the wake of these modifications, some parts of campus have still not had a fair share of these changes. Among these are the absence of a sidewalk from the Junction at FELT towards the shuttle station at the New Site as well as the presence of electric poles and signage as seen in Figure 22.

Other areas of concern include many pot holes on existing sidewalks all over campus as well as the poor placement of some of these facilities. For instance, the route from the GLICO roundabout to the Science Faculty has a Zebra crossing before the ramble strip. This is a direct contradiction to the UNDP (2010) recommendation for accessible street crossing. The ramble strips are supposed to reduce vehicular speed while approaching the Zebra crossing therefore, the ramble strip should always be placed before the Zebra crossing and not the other way round as we have on campus. When the Head of Projects attention was drawn to this, he indicated that:

> *Ok. I think we need to do a proper calibration and that is the more reason why we introduced the traffic lights. Once you are approaching the crossing point and you see the traffic light, you should stop there for those at the crossing point to cross or this ramble strips should have been here (respondent pointing to an area before the crossing point) to make driver reduce their speed. We call them road furniture and we need to do all those things.*

Figure 22: Route without sidewalks.

Source: Fieldwork, 2016

Of course, the traffic light mentioned in the delivery above was more than 200 metres away from the zebra crossing and this would have had little impact in reducing the speed of the vehicle since the crossing point came before the traffic lights and the ramble strips instead of the other way around where the ramble strips and the traffic lights should have preceded the crossing point.

The study also inquired about another discrepancy observed, that is, the position of the zebra crossing in relation to the curb cuts on the highway adjacent the Main Library. The zebra crossing was about 30 metres away from the floor of the curb cut (see Figure 13) and this was a direct contradiction to the UNDP's (2010) recommendation for an accessible street crossing. With the existing infrastructure, a student with disability would have to move about 30 metres into the road to have access to the zebra crossing. The attempt to use the unmarked areas exposes students to the risk of accident. When the Head of Projects attention was drawn to this, he admitted this discrepancy but could not indicated that his outfit would take measures to correct this anomaly.

Since the disability policy on campus did not give any indication of when the identified policies would see the light of day, the study went further to inquire from the Head of Projects when these policies would be implemented. In his response, he indicated that the Vice Chancellor of the University in 2014 had set up an implementation committee to study the policy and make recommendations on how the targets in the policy would be attained. Documents obtained from the Office of the Dean of Students revealed that, this committee was chaired by then Deputy Dean of Students. By December 2014, the committee had sat six times and finally submitted its report to the Vice Chancellor. Issues discussed in the recommendations cover admissions, funding of disabled students, access to public facilities and other transportation needs.

The committee actually acknowledged the absence of walkways on some parts of campus from the administration block to Oguaa hall, the poor condition of existing walkways as well as the frustration experienced by disabled students when joining the shuttles. In the report, these frustrations emanate from the simple reason that these people are exempted from the payment of fares as revealed in the study.

The committee's recommendation included the construction of walkways with guardrails from the Old chapel to Oguaa hall, create more parking space at the old site to decongest the route from the administration block to the Oguaa hall, extend the sidewalk from the shuttle station to the Main Library , remove the telephone pole on the route to Sasakawa from Science as well as mount a No Parking sign on the route at Zenith bank as well as issuing of special ID cards that will reduce the frustration of disabled students as they use the shuttles.

After submitting these recommendations in December 2014, very little has been seen of this policy. There are no sidewalks connecting the Central Administration to the Oguaa hall, vehicles still park all over the Old site and the road at the Zenith Bank, some sections of the sidewalks are still in deplorable conditions and the disabled students have still not received their special ID cards hence the frustration in joining the shuttles especially when they encounter drivers of the privately-owned shuttles. The purpose of the ID cards is an issue worth discussing. The identified challenge with these students with disability had nothing to do with the driver's difficulty to identify students with disability though there are some partially sighted students who may appear to have no form of impairment. The real issue is the attitude of the private shuttle drivers in admitting these students in their buses knowing very well that they are exempted from the payment of the shuttles fares. When this underlying factor is addressed, student's usage of the shuttles will be with little frustration.

Secondly, these recommendations do not even shed light on vehicular specification and accessories that are needed to create some comfort to students with disability. The frustrations encountered by these students do not only end with the driver. Even if the drivers allow these students to enter, existing shuttle heights are above the recommended 230 millimetres hence the need for a boarding platform, push bells and priority seats which were all not discussed in the recommendation.

When asked why the policy has still not seen the light of day after a year and four (4) months of submission, the Head of Project at the Directorate of Physical Development and Estate Management had this to say:

In terms of the disabled, recently there has been the commission of a committee, to look at the disability recommendation and I have on my table 'report of the University of Cape Coast disability policy implementation committee' which spells out the introduction, terms of reference, membership, the Dean of Students. It is very comprehensive and we are studying it to incorporate their recommendation into the designs. In fact, they have commended us on the work my outfit is doing but we still have to work more in terms of lighting, illumination, transportation service and all those things. So as a physical developer wing of the University, we are aware of the mobility needs of person with disability and so from now (that is) in fact, we have started long ago, we are going to incorporate the recommendations since this is a very comprehensive document. I don't know whether a copy can be given to you but it has not been approved by council yet so I cannot give it to you. But if there is the need for me to give you copies subsequently, I will.

If the above was anything to go by, then one can easily conclude that after a decade of the passing of the Ghana's Persons with Disability Act (Art 715), the University of Cape Coast has no working document for the transport needs of students with physical disability. When asked on why it has taken the Development Section this long to address the travelling needs of students with disability, the Head of Projects added that:

Why has it taken Ghana 57 years to now draft a law to indicate that all public facilities should be disability friendly? But yet if you go

to Parliament, that place is even not friendly. In this part of the globe, there are so many things that are in books but we don't implement it. If you compare it to some areas, they will make sure that those things are incorporated. It all boils down to cost and funding.

Summary

This chapter reveals the transport needs and mobility constrains of 28 visually impaired and one wheelchair user in the University of Cape Coast. It also sheds light on the roles of key stakeholders in meeting the transport needs of students with disability on campus. The study revealed that, the dominant passenger facility on campus was the sidewalk but these sidewalks were saddled with path obstructing objects like potholes, electric poles and discontinuity. When it comes to crossing aids, none of the traffic lights on campus was augmented with audible transmitters to aid the visually impaired. With reference to the passenger environment, the absence of a documented policy to offer free ridership to these students provided the platform for drivers of privately owned shuttles to deny these students from enjoying free shuttles services.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Introduction

This chapter presents a summary of the major findings of the study, the conclusions and recommendations. It also presents the contributions of the study to knowledge and some areas for further research.

Context of study

The main objective of the study was to assess the road transport infrastructure and mobility needs of students with physical disability in the University of Cape Coast. Specifically, the study sought to:

1. Examine the physical barriers that impede the movement of students with physical disability in the University of Cape Coast;
2. Determine the extent of usage of University shuttles by students with physical disability; and
3. Assess the role of stakeholders in the provision of accessible transport facilities for students with disability in the University of Cape Coast.

Employing a qualitative research design, a total of 35 participants comprising 31 visually impaired students, one wheelchair user, and three key stakeholders provided information for the study. Five visually impaired students were not covered due to the unavailability of these participants during the period

of the data collection. Both the visually impaired students and the only wheelchair user were selected using snowball sampling since these students were residents in the traditional halls. The key stakeholders for the study were purposively selected.

The research instruments used for the study were interview guides and observation checklists. Data collected included the presence, dimension and condition of selected road and vehicular facilities in UCC, extent of students with disability usage of campus shuttles, barriers in the passenger environment that impede the movement of students with physical disability as well as the role of stakeholders in responding to the mobility needs of these students. Data collected was analysed and presented using frequencies, percentages and direct quotations which put participants' comments into proper context.

Summary of findings

The main findings of the study were as follows:

1. The majority of participants were visually impaired students (96.5%), with 66.7% of total participants being males.
2. The age range of participants was dominated by 23 to 28 year olds (55.5%) with those above 34 years recording the least (3.7%).
3. The most dominant pedestrian facility on UCC campus was the sidewalk or the pavement whose width ranged from 1.05 to 2 metres as recommended by the UNDP (2010). The observed challenge was the discontinuities or abrupt end of sidewalks. These were particularly present on some high traffic routes like

the Sasakawa and Zenith Bank route. At these places, students with disability had no option than to share the road with the vehicles thus increasing the risk of accidents and injuries.

4. Data from the field revealed that only 41.9% of the 38 segments studied offered students with disability with the best of convenience in usage since these sidewalks had no path obstruction, well fitted bricks and even surfaced pavement.
5. The safety of students would best be ensured when high curbs are maintained on all sidewalks. From the study, 20 out of 38 segments had a curb height between 130 and 180 millimetres which was within the accepted range as observed by Hoy (2003). These heights could alert both drivers and commuters with disability of any significant change in height as they transit from the pavement to the road or vice versa.
6. The minimum walking distance to the closest educational facility commonly used by participants was about one kilometre. This refers to the distance from Casely Hayford Hall to the Faculty of Arts. In addition to the long walking distance, no known rest stop that offers shelter against harsh weather condition was found on campus.
7. Though there are traffic lights on campus, these do not meet the needs of the visually impaired since this group of students have no way of identifying the colours of the traffic light. Furthermore, none of the traffic lights had audio transmitters that

would transmit distinct sounds to alert visually impaired on when to cross the road or stop at a point.

8. The study revealed that only one of the two pedestrian islands met the requirement of the UNDP (2010) standard and this was the island adjacent the Main Library. The other island was located on the route to the Science Faculty and so far as the crossing aids of students with disability is concerned, this island is the least accessible.

9. Zebra crossing and road traffic calming measures are also important for the movement of disabled students. Of all the 4-way junctions on campus, none had both humps or ramble strip and a zebra crossing on all 4 sides of these junctions.

10. For the passenger environment, the study revealed that floor height of the 18 vehicles examined were between 320 and 520 millimetres which exceeded the maximum standard height of 230 millimetres. With observed high floor height, no shuttles on campus had boarding platforms that would make it easier and faster for students with disability to board and alight from the shuttle.

11. With reference to offering exclusive seats or space for students with disability in the shuttles, none of these shuttles had any provision like that. To this effect, both students with and without any form of disability were free to sit anywhere so long as the seat was vacant.

12. The convention to make shuttles free for students with disability was not observed as free ridership was perceived by drivers as a loss of income. This was the case of privately owned shuttles as compared to the shuttles provided by the University.
13. It emerged that, the selection of potential shuttle operators for the University did not even include the presence of any disability friendly facilities in the shuttle.

Conclusion

The physical pedestrian infrastructure presents the most challenge to students with physical disability since walking is a fundamental human activity. With reference to independence in usage of road transport facilities, students with disability in the University of Cape Coast would still have to depend on non-disabled students for assistance. The presence of food vendors, pot holes and path obstructing objects further expose these students to the risk of injuries since the visually impaired student stand the risk of bumping into these objects unless they walk with an aid. For wheelchair users, the absence of curb cuts on most sections of the sidewalk implies that, this group of students would find it extremely difficult to access the sidewalks. Even if they are able to do so, the conditions of these sidewalks would make the sidewalk unattractive to these people.

Aside using the pavement, crossing of the road for this group of students further presents a great degree of danger since very few controlled crossing points exist on campus. The absence of a transport policy to regulate all transport activities on campus further worsens the plight of these students.

Though shuttles that operate on campus are expected to be free for students with disability, the ease for students with disability to use these shuttles comes with some challenges due to non-compliance by drivers.

Aside inspecting the health of a potential shuttle driver and the conditions of his vehicle, no attempt is made to determine the presence of other facilities like labelling of priority seats, provision of boarding platform and presence of a push bell or any other assistive technology for students with disability. These render the University shuttles less attractive to students with disability.

Though the Office of the Dean of Students had formed a committee in 2014 to review the current disability policy of the University of Cape Coast, the delay in implementing the recommendations increases the students with disability frustration in using both the pedestrian and passenger facility since prevailing challenges are still encountered every day.

Recommendations

Based on the findings and especially conclusions of the study, the following recommendations are made:

Modification of the pedestrian environment

1. In order to separate pedestrians from vehicles, the Directorate of Physical Development should provide sidewalks with guard rails on all sections of campus. In addition, maintenance exercise should be undertaken on all existing sidewalks. Emphasis on this should be placed on fixing dislodged bricks, levelling sidewalk surface and removal of

path obstructing objects like electric poles, signage and protruding tree branches or roots.

2. The Directorate of the Physical Development should ensure that street lights on the Sasakawa road should be placed at the extreme end of the width of the sidewalk and not in the middle of the sidewalk since this reduces the width of the sidewalk. It would further reduce the frequency with which the visually impaired collide with these poles. Also, the dwarf wall in front of Sasakawa restaurant as well as all protruding branches and trees should be removed since these obstruct the movement of students with disability.

3. In all crossing points including areas of sidewalk discontinuity, the Directorate of Physical Development should ensure the provision of curb cuts with a gentle slope that would allow wheelchair users to easily ascend and descend the sidewalk on their own.

4. The Directorate of Physical Development should recalibrate position of the zebra crossing in relation to the ramble strip adjacent the Main Library. The road calming facility should precede the controlled crossing point and not what is seen at the cited location. The traffic lights on campus should also be augmented with audio signals that would prompt the visually impaired on when to cross or stop.

5. The Directorate of Physical Development in collaboration with the Office of the Dean of Students and the Students Representative Council (SRC) should provide various rest stops on campus that would offer protection against harsh weather conditions. These rest stops should have space for wheelchair users and seats for non-wheelchair users as

well as painted with contrasting colours that would make it easier for students with low vision to locate.

Modification in the passenger environment

1. The Office of the Dean of Students should make provision in the University's Disability Policy, Transport Policy and the Students Handbook for free ridership for students with disability.
2. The office of the Dean of Students, the Transport Officer, Shuttles Committee and Office for Disability Service should review the policy on free ridership to cover all students with disability and not staff as indicated in the current disability policy. Secondly, there is the need to further specify the number of students who can enjoy free ridership on a particular bus since drivers of privately owned shuttles are known to limit the number of such students to 1 or 2. Also, the amendment should prescribe and compel shuttle operators to provide priority seats for students with disability.
3. The Transport Officer and the representative of the shuttles committee should come up with a framework that will outline the requirements of persons who wish to operate shuttle on campus. The content of this framework should go beyond the inspection of the vehicle, its documents and the driver's license but must also include the provision of disability friendly facilities like boarding platforms, assistive technology like push bells and audio transmitters that would allow the driver to announce the various stop points and also give passengers the

opportunity to prompt the driver of their decision to alight without having to shout or asking a non-disabled student to do that.

Contributions to Knowledge

Silverman (2000) asserts that a study's contribution to knowledge could be determined in four areas namely; developing a concept or methodology, thinking critically about an approach, building on an existing study, and being prepared to change direction. In line with the assertion above, this study's contribution to knowledge is in three-fold. First the study has brought to light the experiences of students with physical disability in using road transport facilities on UCC campus and these have informed their travel decisions. Second, the study has also revealed inadequacies in the University's Transport and Disability Policy when it comes to meeting the transport needs of students with disability. The deficiencies identified emanated from a comparison of the existing polices in UCC to the Persons with Disability Act as well as UNDP (2010) standard. Finally, the study developed a conceptual framework that exclusively assesses the impact of transport infrastructure on the mobility needs of students with physical disability.

Suggestions for Further Research

This study focused on the lived experiences of students with physical disability using the existing pedestrian and passenger facilities on campus. The study subsequently examined the role of key stakeholders in meeting the mobility needs of these students. Further studies can be undertaken to evaluate

the level of accessibly when it comes to disabled students' usage of common facilities like the UCC Main Library and selected lecture theatres or offices.

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APPENDIX A

AUDITING SCHEME PEDESTRIAN FACILITY

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

Introduction: This auditing scheme seeks to outline the number, condition and dimension of selected road facilities on UCC campus. The topic for this study is 'Road Transport Infrastructure and Mobility among students with disability in the University of Cape Coast' and the findings will be used to validate the account of students with physical disability and also produce a descriptive on the state of transport facilities for students with disability.

Location:				
Road Conditions	Variables	Availability	Condition	Dimension (mm)
	1. Pedestrian facility	Yes [ ] No [ ]	Poor [ ] Good [ ] Average [ ]	Width:
	3. Walkway on side of the road		No walkway [ ] One side [ ] Both sides [ ] Exclusive walkway [ ]	
	4. Curb height			Height:
	5. Curb cut	Yes [ ] No [ ]		

	6. Topography of pedestrian facility			Elevation:
	7. Zebra Crossing at crossing points	Yes [ ] No [ ]		
	8. Tactile surface and signage	Yes [ ] No [ ]	Poor [ ] Good [ ] Average [ ]	Width:
	9. Signage and other obstacles	Yes [ ] No [ ]		Distance from edge of curb:
	10.Disability parking space	Yes [ ] No [ ]	Poor [ ] Good [ ] Average [ ]	Width:
	11. Communication tools	Yes [ ] No [ ]	Pictogram [ ] Braille [ ] Directional [ ] Signs	
	12. Bus stop	Yes [ ] No [ ]		
	13. Ramps at bus stop	Yes [ ] No [ ]	Poor [ ] Average [ ] Good [ ]	Elevation:

	14. Reserved seats or designated areas for students with disability	Yes [ ] No [ ]		

APPENDIX B

AUDITING SCHEME PASSENGER FACILITY

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

Introduction: This auditing scheme seeks outline the number, condition and dimension of selected vehicular facilities on campus shuttles in UCC. The topic for this study is 'Road Transport Infrastructure and Mobility among students with disability in the University of Cape Coast' and he findings will be used to validate the account of students with physical disability and also produce a descriptive on the state of transport facilities for students with disability.

License Figure number of vehicle:				
Vehicular Conditions	Variable	Availability	Condition/Type	Dimension (mm)
	1. Floor height			Height:
	2. Disability signage on bus	Yes [ ] No [ ]		
	3. Width of entrance			Width:
	4. Ramps or boarding platforms	Yes [ ] No [ ]		
	5. Hand rails at entrance	Yes [ ] No [ ]		

	6. Interior handrails	Yes [ ] No [ ]		
	7. Priority seats or designated areas	Yes [ ] No [ ]	1. Behind [ ] driver 2.First seat [ ] after entrance [ ] 3.Anywhere in vehicle	Length: Breath:
	8. Assistive technology	Yes [ ] No [ ]	1.Bell [ ] pushes 2.Audio [ ] Transmitters 3.Pictogram [ ] e/ Smart Screen tablets 4.Other [ ]	
	9. Clearly labelled signage on bus	Yes [ ] No [ ]		
	10. Floor level from entrance		1. Same [ ] level as entrance	

			2.Higher than entrance [ ]	
	11. Fare policy	Yes [ ] No [ ]	1. Full fare [ ] 2.Subsidized fare [ ] 3. No fare [ ]	
	12.Driver call out major stop	Yes [ ] No [ ]		
	13. Drivers wait all alight before they take off	Yes [ ] No [ ]		

APPENDIX C

INTERVIEW GUIDE FOR STUDENTS WITH DISABILITY

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

Introduction: This interview guide seeks information on transport infrastructure and mobility among students with physical disability in University of Cape Coast to facilitate a project work. The information you provide is purely for academic purpose and you are assured of total confidentiality and anonymity

Date of interview:

Place of interview.

Interviewer name:

Sex:	Type of disability:
Level:	Age:
Programme:	Hall of residence:

1. What is disability?
2. What routes do you frequently use in the University of Cape Coast?
3. How often do you use this route in a week?
4. Why do you prefer the identified routes?
5. For what purpose do you mainly use that identified routes?
6. As a student with disability, do these routes come with pedestrian walkways at both ends?
7. How would you describe the condition of the walkways?
8. In your opinion, are these walkways wide enough to accommodate you and another commuter who walk in the opposite direction?

9. Is your movement obstructed by objects like electric poles and sign posts?
10. At crossing points, do drivers wait for you to cross the road?
11. Do the crossing points come with curb cuts that allow you to easily move from the pedestrian walkway unto the road?
12. Do you use tactile surfaces for directions or warnings when commuting on campus?
13. In times of heavy traffic on the walkways, do you compete with non-disabled students for space on the walkway?
14. Can you tell me of any disability friendly road transport facility you have seen on UCC campus?
15. Do your bus stops come with designated waiting seats or space for students with disability?
16. From the road, how is it easy to access the waiting space at the bus stop? (If the bus stop is on a higher platform than road, does it come with a ramp?
17. Is the inclination of the ramps good enough to accommodate the mobility needs of students with disability?
18. Does the bus stop have a boarding platform that allows students with disability to easily join the buses?
19. Do you join queues and pay transport fares?
20. How easily is it for you to enter the vehicle? Is the entrance wide enough for you?
21. Is there a reserved seating area for you (students with disability) in the bus?

22. Is there a PA system that provides audible travel information to commuters?
23. Apart from a PA system, what would be your source of travel information with reference to arrival time, departure time and other related information?
24. In the bus, what is the best way to communicate your intention to the driver?
25. In your experience, are the drivers or conductors friendly to you?
26. Do you see any disability signage on the bus or at the bus stop?
27. Aside having a bus for both disabled and non-disabled students, do you enjoy paratransit transport services?
28. Are you aware or familiar with the disability Act 715? Could you please say what you know about it?
29. Is there anything you want to tell me aside what we have discussed?

APPENDIX D

INTERVIEW GUIDE FOR TRANSPORT OFFICER

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

Introduction: This interview guide seeks information on transport infrastructure and mobility among students with physical disability in University of Cape Coast to facilitate a project work. The information you provide is purely for academic purpose and you are assured of total confidentiality and anonymity

Date of interview:

Place of interview.

Interviewer name:

1. Who would you consider as a student with disability?
2. Are you aware of any existing intervention or policy that seeks to address the general needs of students with disability?
3. Are you aware of any existing regulation that caters for the transportation needs of students with disability?
    i. When was this regulation enacted?
    ii. Has there been any amendments? What were the changes?
4. Are you aware of any international declaration that seeks to address the mobility needs of persons with disabilities?
5. Are you aware of any international standards for accessible road infrastructure and services for persons with disabilities?

6. To what extent do you offer training services to your drivers and other supporting staff when it comes to meeting the transport needs of students with disabilities?
7. What contribution do you make when it comes to the acquisition of buses in the University of Cape Coast?
8. What would you consider as the ideal bus stop (with regards to facilities and specifications) that would cater for both disabled and non-disabled students?
9. Aside offering free ridership to students with disabilities, some students with disabilities have cited the absence of disability friendly accessories as reasons for low ridership. How does your outfit intend to address this concern?
10. Has the University got a transport policy? What does it say about meeting the transport needs of students with disability?
11. Do you think students with disability have not had a fair share of the shuttle services as compared to students without disability?
12. Are you aware or familiar with the disability Act 715? Could you please say what you know about it?

APPENDIX E

INTERVIEW GUIDE FOR DIRECTOR OF DEVELOPMENT

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

Introduction: This interview guide seeks information on transport infrastructure and mobility among students with physical disability in University of Cape Coast to facilitate a project work. The information you provide is purely for academic purpose and you are assured of total confidentiality and anonymity

Date of interview:

Place of interview.

Interviewer name:

1. Who would you consider as a student with disability?
2. Are you aware of any existing intervention or policy that seeks to address the general needs of students with disability?
3. Are you aware or familiar with the disability Act 715? Could you please say what you know about it?
4. Are you aware of any international declaration that seeks to address the mobility needs of persons with disabilities?
5. Just as the transport section has a transport policy, is there a similar policy that guide every road construction that takes place on campus?
6. If a road is to be constructed on campus, who decides on what facilities to include when constructing such a road?
7. Can you give me five (5) disability friendly road facilities that exist in the University of Cape Coast?

8. From observation, one prominent disability friendly facility is the presence of a higher curb at certain portions of the road. What accounts for the deficit in other disability friendly facilities?
9. What plans do you have to close the identified gap?
10. With respect to the road facilities, do you think your outfit has given students with disabilities enough facilities to meet their travel needs?

APPENDIX F

INTERVIEW GUIDE FOR THE DEAN OF STUDENTS

UNIVERSITY OF CAPE COAST

DEPARTMENT OF GEOGRAPHY AND REGIONAL PLANNING

Introduction: This interview guide seeks information on transport infrastructure and mobility among students with physical disability in University of Cape Coast to facilitate a project work. The information you provide is purely for academic purpose and you are assured of total confidentiality and anonymity

Date of interview:

Place of interview.

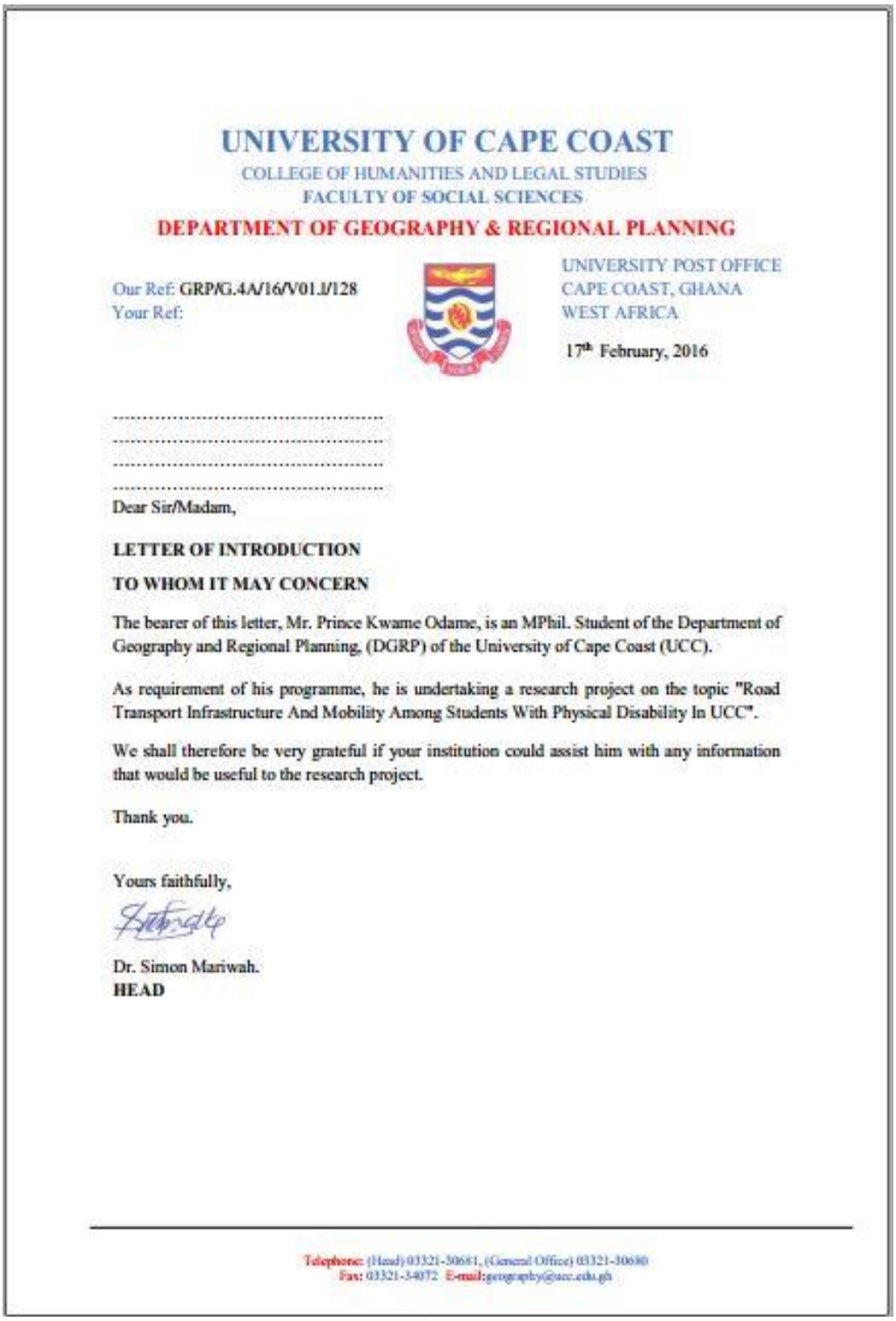
Interviewer name:

1. Who would you consider as a student with disability?
2. Are you aware of any existing intervention or policy that seeks to address the general needs of students with disability?
3. Are you aware any existing regulation that caters for the transportation needs of students with disability?
4. Can you tell me the number of students with disability in University of Cape Coast?
5. What special services does the University offer to students with disabilities?
6. Are you aware of any disability policy for the University of Cape Coast?
7. Please cite any five (5) disability friendly road and transport facilities in the University of Cape Coast.

8. What role do you play when it comes to the acquisition and operation of the shuttles especially when it comes to meeting the transport needs of students with disabilities?
9. Universal transport facilities cater for the transport needs of all road users. Do you think existing road facilities meet the mobility needs of students with disability?
10. To bridge the mobility challenges among students with disabilities, what role would your outfit play to make this a reality?

APPENDIX G

Introductory letter from the Department of Geography



UNIVERSITY OF CAPE COAST
COLLEGE OF HUMANITIES AND LEGAL STUDIES
FACULTY OF SOCIAL SCIENCES
DEPARTMENT OF GEOGRAPHY & REGIONAL PLANNING

Our Ref: GRP/G.4A/16/V01.I/128
Your Ref:

UNIVERSITY POST OFFICE
CAPE COAST, GHANA
WEST AFRICA

17th February, 2016

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Dear Sir/Madam,

LETTER OF INTRODUCTION

TO WHOM IT MAY CONCERN

The bearer of this letter, Mr. Prince Kwame Odame, is an MPhil. Student of the Department of Geography and Regional Planning, (DGRP) of the University of Cape Coast (UCC).

As requirement of his programme, he is undertaking a research project on the topic "Road Transport Infrastructure And Mobility Among Students With Physical Disability In UCC".

We shall therefore be very grateful if your institution could assist him with any information that would be useful to the research project.

Thank you.

Yours faithfully,

Dr. Simon Mariwah.
HEAD

Telephone: (Head) 03321-30681, (General Office) 03321-30680
Fax: 03321-34072 E-mail:geography@ucc.edu.gh