HIGH SCHOOL PUPILS' ATTITUDES TOWARDS MAPWORK ON THE ZAMBIAN COPPERBELT

BY

KENNEDY KASIMBA

A DISSERTATION SUBMITTED TO THE UNIVERSITY OF ZAMBIA IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE DEGREE OF MASTER OF EDUCATION IN GEOGRAPHY EDUCATION.

UNIVERSITY OF ZAMBIA

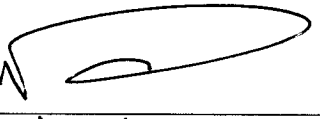
LUSAKA

2008

TABLE OF CONTENTS

DECLARATION

I, Kennedy Kasimba, declare that this work is my original work and that it has never been submitted to the University of Zambia or any other university for the award of a Master of Education (MEd.) degree in Geography Education before. All sources of data and literature on related works previously done by others, used in the production of this dissertation have been dully acknowledged. If any omission has been made, it is only because to err is human.

Signed: 

Date: 09/04/08.

APPROVAL

This dissertation of Kennedy Kasimba is approved as fulfilling part of the requirements for the award of the degree of Master of Education in Geography Education by the University of Zambia.

Examiners' Signatures

SIGNED: _____ DATE: 9th April, 2008

SIGNED: _____ DATE: _____

SIGNED: _____ DATE: _____

ACKNOWLEDGEMENTS

I am deeply indebted to Dr Mwendabai C. Namafe for the fatherly, professional and, most of all, critical and scholarly guidance and inspiration accorded to me from the conception of the idea to embark on this study to its completion. I am equally greatly indebted to Han Songguang of Singapore for his invaluable assistance. Similarly, I am very grateful to Mr. Mwale, the Information Technology (IT) director and Mr. Siamunako, the Geography Specialist both of Examinations Council of Zambia (ECZ) for facilitating my access to data on School Certificate (Grade 12) paper 1 geography item analysis schedules. Many thanks are also due to the Copperbelt Provincial Education Officer (PEO), Mr. Kamutumwa, for allowing me to conduct the research in selected Copperbelt High schools. Equally thanked too are Mr. Mwale, the Teacher Education Officer and Mr. Daka, the Senior Planning Officer in the Directorate of Planning and Information, both of Copperbelt Province for connecting me to various school managers and for providing vital statistics, respectively.

Many thanks also go to all the school managers, deputy school managers and teachers of geography of the following High schools that took part in the study: Mpatamatu, Kansenshi, Ibenga, Mpongwe, Kalulushi, Kalumbwa, Hellen Kaunda, Kantanshi, Chikola and Chililabombwe for their immeasurable assistance, co-operation and hospitality.

Many thanks also go to Mr. and Mrs. Muleya of Mufulira for their material and logistical support and Charity of Luanshya for her logistical support. Many thanks also go to Mr. and Mrs. Musonda, Mr. and Mrs. Chibawe, Juliet, Fostina, Agatha and bo Sitali for having been there for me in hard and trying moments when I was far away from my

family. I am very grateful to my dear sister, Given M. Mwemba of Chinsali for her ceaseless prayers and maternal encouragement and for her ability to see the humorous side during the many temporal setbacks I had. Thanks also to my sister Ephe.

I also want to sincerely thank my employers, Ministry of Education and the Principal, Mr. F.M Chilufya, of Malcolm Moffat College of Education for granting me paid study leave and for sponsoring me respectively, to enable me pursue the Masters degree programme. I am equally grateful to Mr. Z. Kaira for the encouragement and inspiration to remain focused. I remember his motto: "It is not easy but it is worth it." Special thanks go to Mr. Danny Mumba and Mr. Lawrence Maleka for participating in the production of questionnaires.

Finally, thanks also go to my fellow graduate students, Maud, Nthembe, Simwawa and my room mates Adrian and Mr.Longwe for their support and encouragement, without which I may not have managed to go through my research.

Above all, I wish to acknowledge the sustaining power and presence of our Lord and Saviour Jesus Christ during my studies who in Deuteronomy 8:18 says: "...it is He who gives us power to get wealth...." and in John 15:5 says: "I am the vine, ye are the branches: He that abideth in me, and I in him, the same bringeth forth much fruit: for without me (Jesus) ye can do nothing." Most of all, the inspiration from Philippians 4:13 which says: "I can do all things through Christ who strengthens me." Glory be to God.

May God bless and reward you all in His own infinite wisdom and mercies.

LIST OF TABLES

Table No **Pages**

LIST OF FIGURES

Figure No **Pages**

LIST OF APPENDICES

LIST OF ACRONYMS

CDC	Curriculum Development Centre
CSO	Central Statistics Office
DEBS	District Education Board Secretary
DIP	Directorate of Information and Planning
ECZ	Examinations Council of Zambia
GCSE	General Certificate of Secondary Education
HOD	Head of Department
HOS	Head of Section
IT	Information Technology
MOE	Ministry of Education
NGA	Nigerian Geographical Association
NISTCO	National In-Service Teachers' College
PEO	Provincial Education Officer
OS	Ordnance Survey
TVTC	Technical and Vocational Teachers' College
UNICEF	United Nations Children's Fund
UNZA	University of Zambia
ZGA	Zambia Geographical Association
USA	United Sates of America

DEDICATION

This work is dedicated to my darling wife, Mainza and our dear and beloved children- Thandiwe, Thembiso, Daliso, Siphiwe and Thabo for enduring months of loneliness and for their incalculable financial, material and moral support, and patience during the time I was pursuing my studies. May you be inspired by dad's achievements. May the omnipotent, omniscient and omnipresent God bless you exceedingly and abundantly.

ABSTRACT

This study was prompted by the general research problem arising from a concern over the dismal performance of High school pupils in the mapwork component of the Zambian School Certificate Geography paper 1 (2218/1). This problem was against the background of the paucity of knowledge in this area of Geography Education. The study sought to address the following research questions:(i) What are the attitudes of High school pupils towards mapwork as a component of geography on the Zambian Copperbelt?; (ii) What factors influenced such High school pupils' attitudes towards mapwork?; and (iii) Which aspects of mapwork do selected High school pupils perceive most challenging to learn and why? The study aimed at investigating High school pupils' attitudes towards mapwork as a component of geography, on the Zambian Copperbelt. Specifically, the objectives were: first, to investigate attitudes of High school pupils on the Zambian Copperbelt towards mapwork as a component of geography. Second, to determine what factors influenced such High school pupils' attitudes towards mapwork. Third, to establish aspects of mapwork which selected High school pupils perceived to be most challenging to learn and why?

This study employed a survey research design targeting Grade 12 High school pupils taking geography in the following randomly selected High schools on the Zambian Copperbelt: Chililabombwe, Chikola, Kalulushi, Hellen Kaunda, Kalumbwa, Mpatamatu, Ibenga, Mpongwe, Kantanshi and Kansenshi (see map in Figure 1). In total, the study had 296 respondents i.e. 274 pupil and 22 teacher respondents respectively. The 10 High schools were randomly sampled after categorising the 58 High schools on the Zambian Copperbelt province according to districts. The pupil respondents in the study were randomly sampled after purposively coming up with Grade 12 classes that took geography in each of the 10 High schools. Structured questionnaires with both closed and open ended questions were used to collect data from both pupil and teacher respondents. The closed and open ended questions were meant to generate both quantitative and qualitative data respectively.

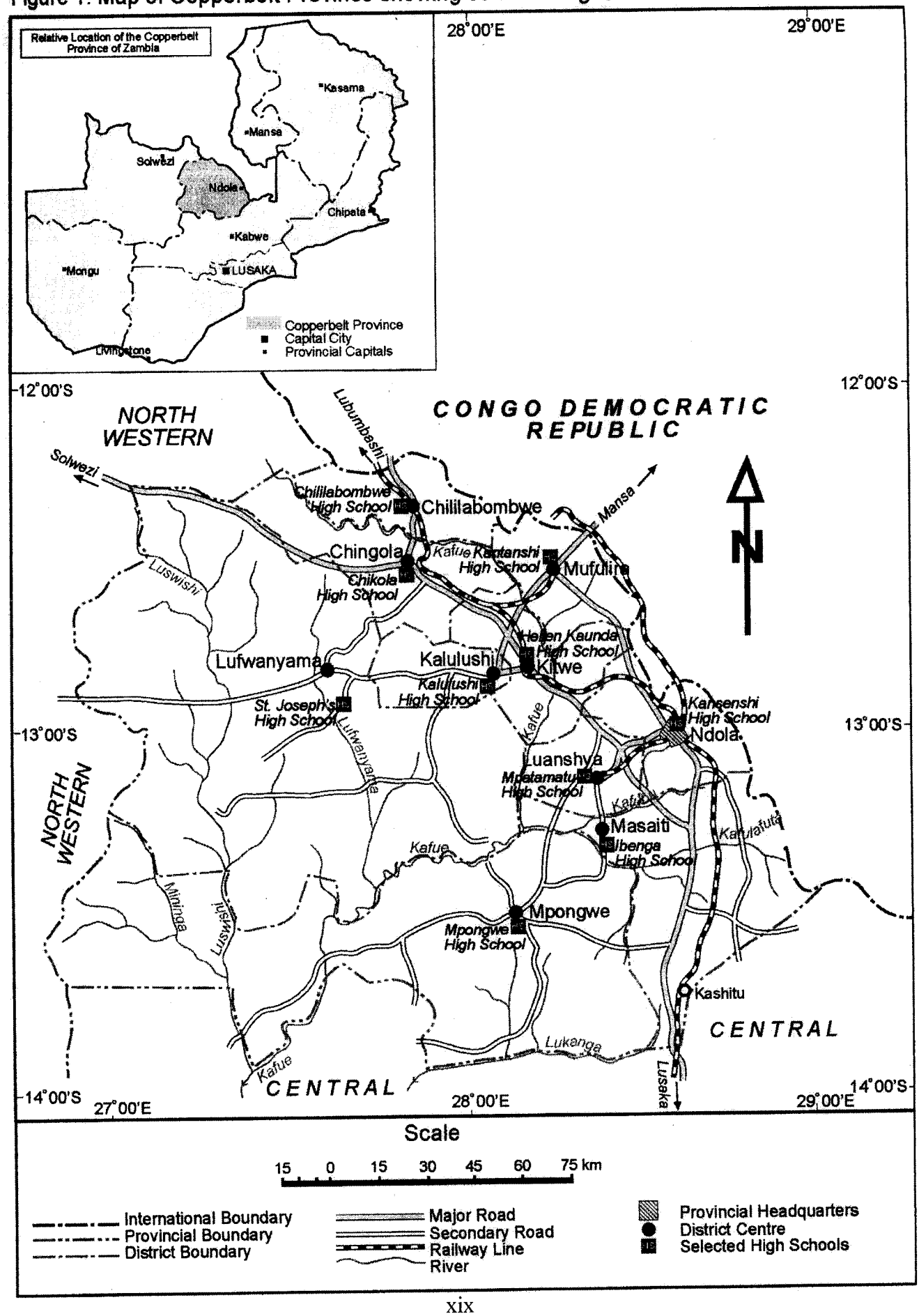
In view of the foregoing objectives of the study, the main findings were as follows: With respect to objective number 1, the study established that 72.6 percent of the pupils indicated that they liked mapwork compared to 27.4 percent of the pupils who indicated that they did not like mapwork. This means most pupil respondents indicated that they liked mapwork. With respect to the second objective, the study established that High school pupils' attitudes towards mapwork on the Zambian Copperbelt were influenced by the interplay of the following factors: (a) Teacher factor; (b) Time factor; (c) Content factor; (d) Methodology factor; (e) Utility factor; (f) Pupil factor and (g) Other factors (e.g. co-curricular activities). With regard to the third objective, the study established that the mapwork aspects perceived most challenging by pupil respondents were three and were ranked as follows by percentage (the major reasons why they perceived the stated mapwork aspects most challenging are in brackets): (i) six figure grid reference, 12.4 % was the highest (Reasons: required very precise mathematical answers and was confusing); (ii) Calculation of Area, 4.7 % was the middle percentage (Reasons: never been taught, not well explained, not done practically, difficult to tell boundaries on a

map, difficult for a place one has never been to) ; and Four figure grid reference, 1.1 % was the lowest (Reasons: Teachers did not teach, difficult to understand clearly and was mathematical).

The key conclusions of the study were as follows: first, the dismal performance in mapwork section of geography paper (2218/1) could be explained by an interplay of factors indicated in Figure 18 of this study other than attitude. Second, pupils' positive attitudes alone without a corresponding motivation (from teachers) and ability (from pupils) could not achieve better results. Third, the mapwork aspects pupils perceived to be most challenging were mainly mathematical in nature and this was due to the high dosage of physics and mathematical principles in mapwork.

In view of the findings of this study, the researcher recommends that geography teachers should take advantage of pupils' positive attitudes towards mapwork and motivate their pupils as early as Grade 10. Additionally, school managers should, on one hand not offer geography to pupils who are weak in physics and mathematics and, on the other, facilitate continuous professional exchanges among teachers of geography and those of mathematics and physics. Further, teachers should introduce mapwork to pupils on the premise of maps as macroscopes.

Figure 1: Map of Copperbelt Province showing selected High Schools.



CHAPTER ONE

INTRODUCTION

Geography is not defined by the uniqueness of its content, rather, it gains its distinction by the way in which it organises and analyses the data it collects regarding particular aspects of the human experience. Geography organises its information within the context of the spatial environment. The focus of geographic inquiry, even today, is generally recognised to be on spatial interactions, that is, the geographer seeks to understand the significance of human activity within the spatial framework. This means geographers present their data primarily through the construction of maps (State University, 2007). In appreciation of this fact, learning to read and use maps is regarded as an important aspect of the development of graphicacy in pupils. It is in geography that pupils learn the essential maps and the responsibility for teaching map skills rests firmly with the geography teacher. During their secondary school geography learning pupils should encounter a wide range of maps drawn on different scales and for different purposes (Boardman, 1986).

Gopsill (1967), points out that maps enable objects and events to be located in space. They are also used to find a way from one place to another and for indicating what places might look like. Gopsill (1967), further argues that the Geographer's characteristic way of working is to observe, to record and to reason. Thus, the ability to **make** maps and to **read** those which have already been made by other people is quite fundamental to the study of geography. The Ministry of Education in Zambia has, in this regard, acknowledged these points as outlined in the background to this study.

1.1 BACKGROUND TO THE STUDY

The Zambian Ministry of Education [ZME] (1979) stated that one of the aims of the syllabus for High School Geography in Zambia was that pupils needed to be able to develop a spirit of enquiry, observation and imagination through practical work in the study of Geography. In this regard, mapwork is indispensable to the attainment of this goal. Meux (1960) argued that map construction, reading and interpretation provided training in the development of logical thought. Unfortunately, many Grade 12 pupils at national level in Zambia seemed to find difficulties in successfully answering mapwork questions as reflected by their performance in the mapwork section of Geography Paper 1 examinations as illustrated in Table 1.

Table 1: Item Analysis For Geography Paper 1 2218/1 (2003)

Section A: Mapwork and Basic Techniques

NO	ITEM	% OF PUPILS WHO GOT ANSWER CORRECT
1.	Question 1	67.1
2.	Question 2	52.5
3.	Question 3	0
4.	Question 4	35.4
5.	Question 5	24.8
6.	Question 6	52.0
7.	Question 7	26.5
8.	Question 8	46.3
9.	Question 9	72.0
10.	Question 10	45.7
11.	Question 11	23.8
12.	Question 12	26.2

Source: Examinations Council of Zambia (ECZ) 2007.

According to the above Item Analysis Schedule for Geography Paper 1 released by the Examinations Council of Zambia (ECZ) for 2003, the highest percentage of pupils (72.0 %) answered Question 9 correctly. The middle percentage of pupils (35.4 %) answered Question 4 correctly while the lowest percentage (0 %) of pupils answered Question 3 correctly. In short, Table 1 above just emphasises the thrust of this study that performance in mapwork, at school certificate level, is dismal. Greenwood (1966) suggested that pupils afflicted with maporphorbia (i.e. strong fear and dislike of maps) may find maps confusing and this in turn may affect their performance in mapwork.

In a bid to bring out and understand the real causes behind pupils' dismal performance in mapwork as revealed by Table 1, this study sought to investigate High school pupils' attitudes towards mapwork on the Zambian Copperbelt.

1.2 STATEMENT OF THE RESEARCH PROBLEM

As manifested in Table 1, the dismal performance of Zambian High school pupils in the mapwork component of geography paper 1(2218/1) is a cause for concern. Additionally, for a long time now, the field of Geography Education in Zambia had not conducted any study to establish pupils' attitudes towards mapwork in spite of mapwork being part of the prescribed geography syllabus. This meant that at the time of compiling this report, the field of Geography Education in Zambia had no data whatsoever concerning pupils' attitudes to mapwork. Some scholars (e.g. Cox, 1982 and Vene, 2007) have contended that attitude is very critical to any venture which one embarks on and so the same would apply to geography, in general, and mapwork, in particular. In other words, the crux of the problem at play would be stated in question form as follows: What are Zambian High

school pupils 'attitudes towards mapwork and in what ways do such attitudes affect pupils' performances in the mapwork section of Geography Paper 1? This general research question formed the focus of investigation for this study. In order to tackle it systematically, this research question was addressed by means of specific research questions as stated below.

1.3 RESEARCH QUESTIONS

The study was conducted in order to address the following research questions:

a) What are the attitudes of selected High school pupils towards mapwork as a component of geography on the Zambian Copperbelt?

b) What factors influenced such High school pupils' attitudes towards mapwork?

c) Which aspects of mapwork do High school pupils perceive to be most challenging to learn and why?

1.4 PURPOSE OF THE STUDY

The study aimed at investigating selected High school pupils' attitudes towards mapwork as a component of geography on the Zambian Copperbelt.

1.5 OBJECTIVES OF THE STUDY

The objectives of the study were as follows:

a) To investigate attitudes of selected High school pupils towards mapwork as a component of geography on the Zambian Copperbelt;

b) To determine what factors influenced such High school pupils' attitudes towards mapwork.

c) To establish aspects of mapwork which selected High school pupils perceived to be most challenging to learn and why?

1.6 SIGNIFICANCE OF THE STUDY

It is hoped that the findings of this study would provide useful information on the status of teaching and learning of mapwork as a component of geography in both rural and urban High schools of the Copperbelt province of Zambia. The results of the study may provide a means for geography teachers to contribute to the development of teaching programmes focusing on mapwork by facilitating their views, opinions and experiences as regards the teaching and learning of this component of geography. The study might also provide data about the real training needs in mapwork of geography teachers especially for various stakeholders such as colleges of education, University of Zambia, Education Standards Officers and the Ministry of Education to mention but a few. The study may also contribute to quality performance by pupils in the mapwork final examinations.

1.7 DELIMITATION OF THE STUDY

The study was only restricted to selected High schools on the Zambian Copperbelt province and it involved only Grade 12 High school pupils. This meant that Grade 10s and 11s were not part of the study. Furthermore, no private schools were involved in the study. This was due to insufficient data on private High schools availed to the researcher by the office of the Provincial Education Officer (PEO). The study was conducted in both urban and rural High schools of the Copperbelt. The following High schools were classified as urban: Chililabombwe, Chikola, Kalulushi, Hellen Kaunda, Mpatamatu,

Kantanshi and Kansenshi while Ibenga, Kalumbwa and Mpongwe were classified as rural High schools.

1.8 LIMITATIONS OF THE STUDY

Due to financial challenges on the part of the researcher, the research could not be extended to all the 58 High schools on the Copperbelt province. Instead, only 10 High schools were covered. This represented about 20% of the total number of schools on the Copperbelt. The findings may, therefore, not be generalised to other High schools but could be useful for future comparative studies. The researcher also faced the challenge of limited documented sources of literature on the study topic both on the international scene and within Zambia.

The next chapter presents and discusses the theoretical background to maps and mapwork.

CHAPTER TWO

THEORETICAL BACKGROUND TO MAPS AND MAPWORK

2.1 Introduction

This section of the dissertation discusses the theoretical background to maps and mapwork with emphasis on the definitions of a map, the origin of maps and phases in the history of mapmaking, the influence of physics and mathematics on the academic discipline of geography, and the brief history of Ordnance Survey (O.S) maps. Further, this chapter discusses other pertinent issues surrounding dimensions of maps and mapwork with a view to relating them to mapwork pedagogy and findings of this study. This chapter is important in order for the reader to be holistically grounded in various issues of maps and mapwork.

2.2 Definitions of a map

Several definitions of a map by different scholars are presented in the sub-section of this chapter. According to Clarke (2000), a map is a depiction of all or part of the earth or other geographic phenomenon as a set of symbols and at a scale whose representative fraction is less than 1:1. Jackson and Bates (1997) defined a map "as a graphic representation, usually on a flat surface, of selected physical features (natural, artificial or both) of a part or the whole of the surface of the earth, some other planet, the Moon, or any desired surface or subsurface area, by means of signs and symbols and with the means of orientation indicated, so that the relative position and size of each feature on the maps corresponds to its correct geographic situation according to a definite established scale and projection." Webster (1963) defined a map "as a representation, usually on a flat surface, of the whole or part of an area." Harmon, as cited by Clarke (2000), defined

a map as an image depicting the distribution and or position of a feature or features in some sort of space. What this researcher notes, from the definitions above, is that through maps reality is abstracted and this is noted through concepts such as depiction, graphic representation, representation and image depicting. Other concepts that come out, from the definitions above, relate to the use of symbols, scale, projection and orientation to represent spatial relationships on maps.

The most interesting definition of all is that by Harley and Woodward (1987) who contended that since all cultures exist within a given space, it is almost axiomatic (obvious) that they will have codified ways of thinking about the fundamental question of space. Hence, Harley and Woodward (1987) broadened the concept of a map beyond the classic European-understanding that a map is a planar drawing accurately locating natural and human-made places in real geographic space oriented to the cardinal directions with north at the top. Such maps satisfied the needs of Europeans in guiding their explorations and in recording their newly acquired territories. Harley and Woodward (1987) suggest a definition that accommodates spatial mappings of the conceptual as well as the real worlds of non-western people. Hence, the famous definition that a map is a graphic representation that facilitates a spatial understanding of things, concepts, conditions, processes or events in the human world. This researcher wishes to add graphic representation of ideas too to this definition. Suffice to say that Harley's and Woodward's (1987) definition will be the working definition in this document because it helps the reader appreciate the concept of a map from a broader context than the narrower Euro-centric view.

2.3 The Origin of Maps

The information in this paragraph was obtained from the website at the end of this paragraph. The website contends that no one knows for sure when the first map was constructed. But, a probable scenario suggests that the earliest map was a mental image used by some ancient human beings to organise the space in which they lived. The same human beings may have used sounds and gestures to convey spatial information about the local environment to others. Eventually, using a stick to etch a sand canvas that has long since been erased, early humankind may have drawn a likeness of these mental and oral maps. By 2300 BC, Babylonians used clay tablets to record map-like images. Chinese mapmaking traditions date from about the same time. Some early cave and tomb art from China has map-like characteristics. The Greeks are credited with proving that the earth was spherical. Ptolemy, a Greek geographer, created a map of the then known world that marked the culmination of ancient cartography. Following the collapse of the Roman Empire, ecclesiastically influenced "T" and "O" maps dominated cartography for 700 years. These maps with East, the orient, at the top, had water bodies in a T-form separating the continents and an O shaped ocean surrounding them. [http://archive.ncsa.uiuc.edu/sdg/experimental/vatican.exhibit/exhibit/d-mathematics/Ptolemy_geo.html].

In 1187, the magnetic compass revolutionised navigation and led to the development of sea charts, or navigational maps. These early charts were drawn by hand on sheepskins. The travels of Marco Polo in the 1270s and 1280s aroused interest in world maps. The rediscovery of Ptolemy's work and its translation to Latin in 1405 coupled with the arrival of the printing press in 1450 further spurred interest in mapping the world. Up

until this point in time, maps had to be laboriously copied by hand. Because of their cost and scarcity they were the purview of only the rich and powerful. [http://www.nmm.ac.uk/cmr/coll_text/coll_charts.html]

With the invention of the printing press maps could be accurately reproduced on paper and, in this way geographic knowledge became more widely disseminated. Improvements in ship design and navigation, along with the rising interest in exploration, led to the development of a clearer picture of the world. As the empty parts of maps were filled in, maps gained wider distribution and use. The rise of nation-states and their military prowess fueled the need for more accurate mapping. World War II was a stimulus for mapping much of the world. In fact, military purposes have been the driving force in the development of modern mapping technology based on satellite imagery. Until the 1970s maps were drafted in pen and ink, a slow and often frustrating process. With the computer, digital maps can be produced very quickly. One downside to the ease of today's mapping is that computers enable unknowing individuals to produce a large number of erroneous maps very quickly. Hence, one needs to be a wary map-reader (Stephens, 2002).

2.4 Phases in the History of Mapmaking

"The history of mapmaking is a human story of heroics and everyday routine, of personal and national rivalries, of influential mistakes and brilliant insights, of technological innovation and a passion to explore and understand Earth and the universe" [Wilford, 1981]. Evidence of mapmaking suggests that the map evolved independently in many separate parts of earth. Marshall Islanders made stick charts for navigation. Pre-

Columbian maps in Mexico used footprints to represent roads. Early Eskimos carved ivory coastal maps. Incas built relief maps of stone and clay. Chinese literature contains references to maps as early as 7th century B.C [http://math.rice.edu/~lanius/pres/map/maphis.html].

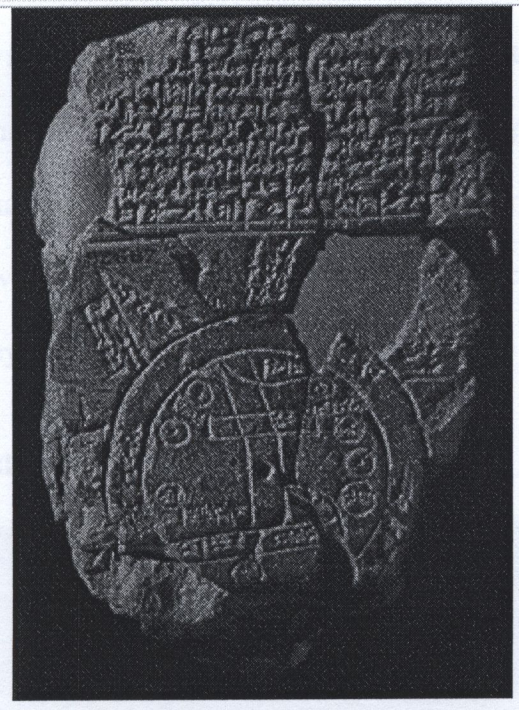
The next few pages will present the literature available about the history of mapmaking starting with the Babylonians to the 21st Century. As alluded to in the introductory part of this chapter, this subsection is important in order for the reader to be holistically grounded in various issues of maps and mapwork. What this presentation on the phases of the history of map making establishes, in the view of this researcher, is that (i) different cultural set ups had different versions or conceptions of spatial relationships at different times depending on the knowledge of the known world then; (ii) each version of map concepts, ideas or thoughts is neither superior nor wrong depending on the known world ; (iii) each version of map concepts, ideas or thoughts could only be understood or deciphered in the cultural context and level of development of a particular period; (iv) each phase of the history of map making emphasises certain elements in their maps depending on who was producing, controlling and sponsoring the map making process and using the maps; and (v) the current strides in the 21st Century map making process would not have been possible without building and standing upon the shoulders of various cartographic giants of previous periods. Some of these cartographers will remain unknown, but their cartographic principles live on.

Suffice to say that the current innovations and creations in map making have been a product of a long but steady progression in perfecting the art of map making over

thousands of years. A few years from now what appears to be the 'best' map will appear like 'nothing' because man is continuously inventing, exploring and discovering new truths with a view to rendering map making and map use better, cheaper and faster.

The website http://math.rice.edu/~lanius/pres/map/maphis.html points out that the earliest direct evidence of mapping comes from the Middle East around 1000 B.C. The ancient Babylonian clay tablets from the Middle East depict the earth as a flat circular disk as shown in Figure 2.

Figure 2: Babylonian Clay Tablets



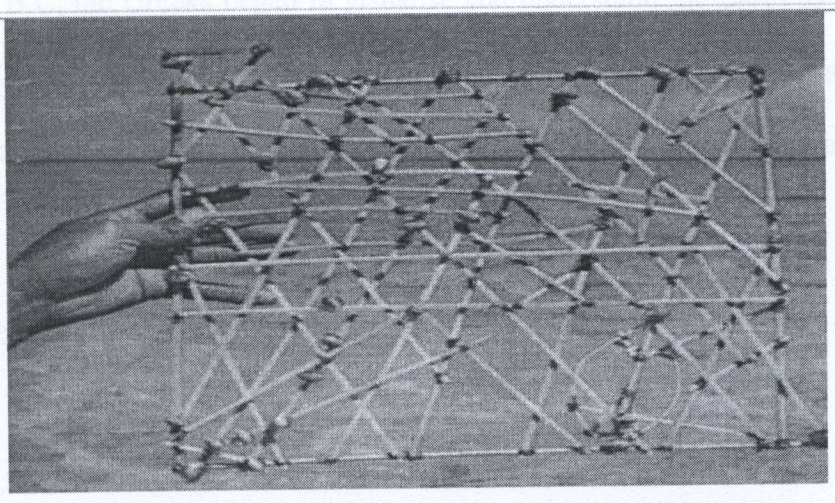
Source: http://myweb.unomaha.edu/~gtesmer/historycartography.htm.

The above clay tablet, dating from around 600 BC, shows Babylon and the surrounding area in a stylised form. Babylon is depicted as a rectangle and the Euphrates River is

depicted as vertical lines. The circular nature of the figure, and the surrounding water, conforms to the religious view of the Babylonians.

Another interesting display of early mapping concepts or ideas is that of the Marshall Islanders, the citizens of the Republic of Marshall Islands. (The Marshall Island is a Micronesian island nation in the Western Pacific Ocean, located north of Nauru and Kiribati east of the Federal states of Micronesia and south of the United States territory of Wake Island or north east of Papua New Guinea. The Marshall Islands geographical co-ordinates are 9 00 N and 168 00 E [www.cia.gov/library]). As shown in Figure 3, Marshall Islanders used sticks constructed of palm ribs bound by coconut fiber with shells to represent the islands. These stick charts are not charts in the western sense but are instructional and mnemonic devices concerned with swell patterns. These stick charts operated as an early navigational tool. The curved sticks represent swells and the short horizontal sticks between the curved sticks represent currents. The stick charts are significant because they show spatial relationships between the islands.

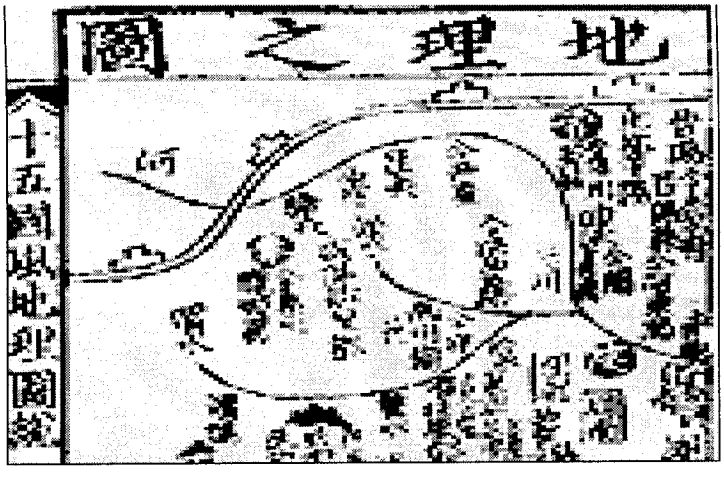
Figure 3: Marshall Island Stick Charts



Source: http://myweb.unomaha.edu/~gtesmer/historycartography.htm.

In ancient times, Chinese cartography was more advanced than their contemporaries'. Their maps were more accurate and detailed compared to other ancient maps as shown in Figure 4.

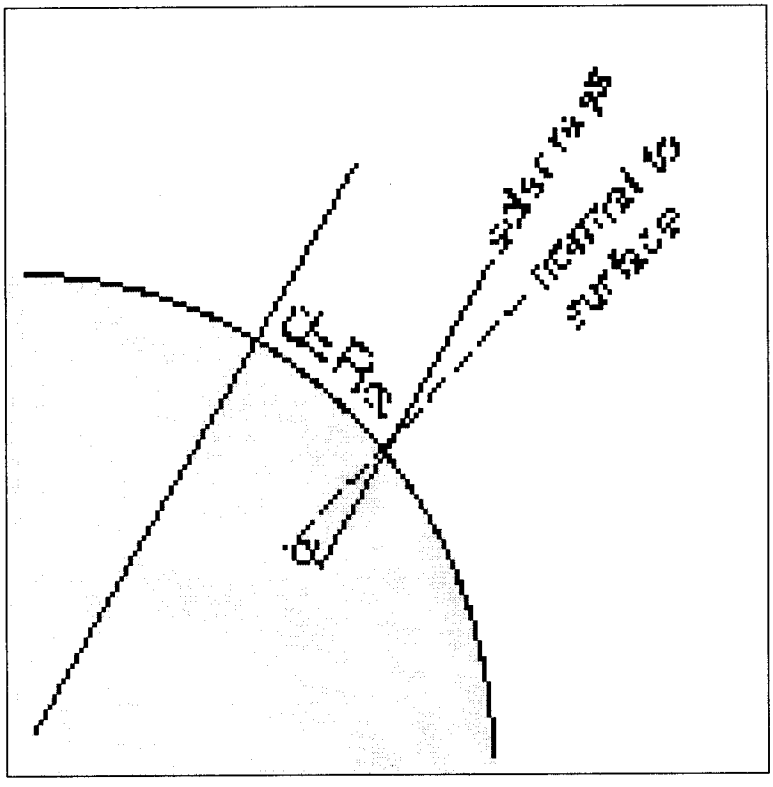
Figure 4: Ancient Chinese map



Source: http://math.rice.edu/~lanius/pres/map/maphis.html

Around 200 B.C, the Greeks began to visualise and understand the Earth as a Sphere. A prominent Greek philosophers and geographer, at the time, Eratosthenes, in fact, accurately calculated the circumference of the earth using angle measures as illustrated by Figure 5.

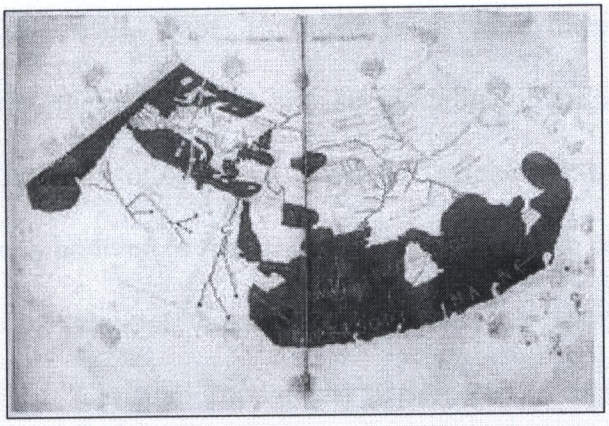
Figure 5: Eratosthenes calculation of the circumference of the Earth



Source: http://math.rice.edu/~lanius/pres/map/maphis.html

In about 150 A.D, Ptolemy came up with a World map in his work entitled *Geographia*. In spite of his errors (he maintained that the sun revolved around the earth, and calculated the earth as 3/4 its actual size), Ptolemy was far ahead of his time on how scientific research should be conducted. He proposed a system of projections and coordinate systems that are still used today. In the 15th century, the manuscript copy of the Ptolemy world map was reconstituted from Ptolemy's *Geographia*. As manifested in Figure 6 below, the Ptolemy's world map indicated that China was at the extreme right. The map also shows an oversized Sri-Lanka and Malay Peninsula.

Figure 6: A 15th century manuscript copy of the Ptolemy world map



Source: http://en.wikipedia.org/wiki/Ptolemy

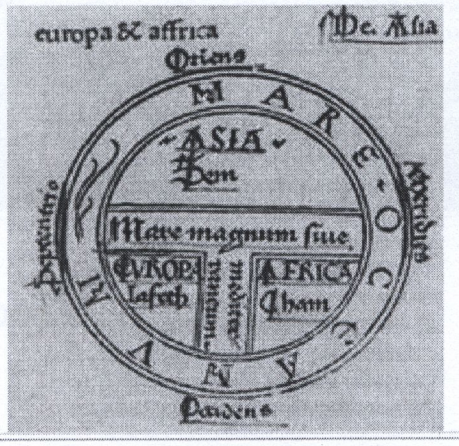
In the 16th century another Ptolemaic map was printed. This world map as manifested in Figure 7, was Ptolemy's attempt to draw the world with the coordinates which today we know as 'longitude' and 'latitude.' Because his calculations for longitude were inaccurate, regions outside of the Mediterranean become extremely distorted.

Figure 7: Ptolemy's attempt to draw the world map with coordinates

Source: http://en.wikipedia.org/wiki/Ptolemy

Another interesting phase in map making is that of the Middle Ages also known as the Era of Ecclesiastic Maps. European maps were more ecclesiastic than cartographic meaning that the maps of the time served religious purposes more than professional and academic matters of mapping. Cosmas Indicopleustes (a Greek monk, traveller and geographer who lived in Alexandria, Egypt in the sixth century) exemplified this concept, incorporating religious themes and references into many of his maps (especially in his work entitled "Christian Topography"). Some maps depicted the Tree of Life in the east (Hartig, 1908). In contrast, Arab maps advanced the earlier Greek practices. Al-Idrisi designed a world map which is still famous in the world. (Idris was an Arab geographer who made a silver celestial globe and a map of the earth engraved on a plate of silver. Additionally, Idris divided the earth into seven horizontal climatic zones, each vertically in 11 and vertical arbitrary sections [Columbia Encyclopedia, 2003]). However, a good example of the Ecclesiastical maps are the "T" and "O" maps as shown in Figure 8.

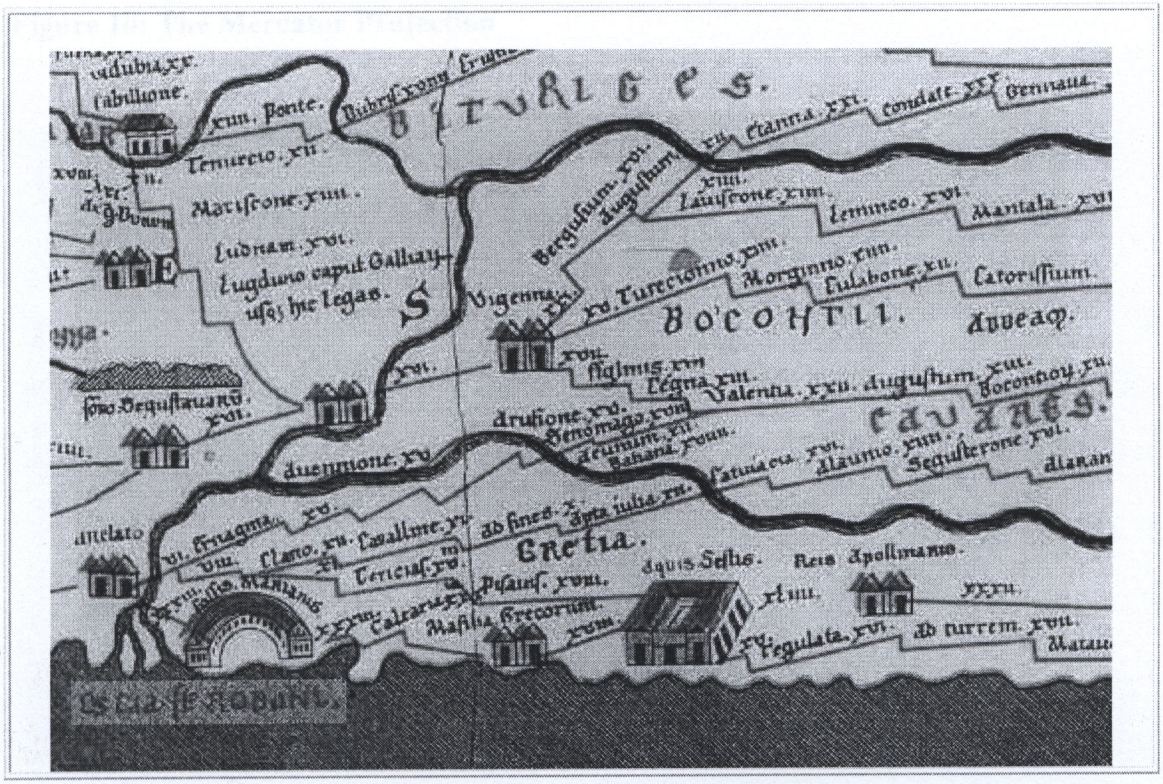
Figure 8: An example of a T in O Map



Source: http://myweb.unomaha.edu/~gtesmer/History.htm

The T in O map is a medieval world map representing the physical world as described by a scholar called Isidore Seville. The map assumes a flat earth. The "T" of the map is the Mediterranean Sea. The T separates the three continents which were known at the time, namely, Asia, Europe, and Africa. The "O" are the oceans that surround the three continents. Another example of maps that were common during the medieval period is that of the Romans as shown in Figure 9.

Figure 9: A Roman Road Map (Peutinger Table)



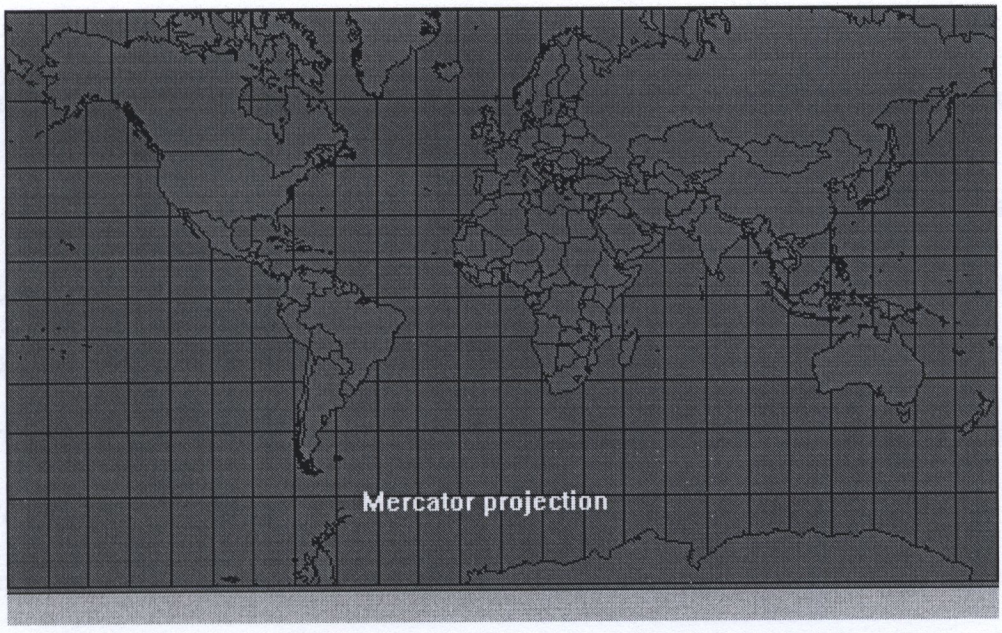
Source: http://myweb.unomaha.edu/~gtesmer/History.htm

The Peutinger Table shown in Figure 9 depicts the road network of the Roman Empire. The oldest surviving map was made during the 13th century. These maps focused on

transportation corridors, and the features one would encounter when travelling along them. The distances between settlements were given, but spatial relationships were generalised.

In the 16th century, new developments took place in map making when Mercator created a map called the Mercator Projection that allowed mariners to sail to their destinations by following a fixed rule called a rhumb line. The Mercator Projection is shown in Figure 10.

Figure 10: The Mercator Projection



Source: http://math.rice.edu/~lanius/images/mercator.gif

Further, in the 17th century, Isaac Newton postulated that due to the centrifugal force of the spinning earth which is strongest at the equator, the earth bulges at the equator and flattens at the poles. According to Newton, the earth is not a true sphere, but a spheroid.

Sir Isaac Newton (1643 -- 1727) was the greatest English mathematician of his generation. He laid the foundation for differential and integral calculus. His work on optics and gravitation makes him one of the greatest scientists the world has known. The implications of Newtonian worldview will be discussed later in part 2.5 of this chapter.

Later, in the 19th century, Europeans implemented the metric system which introduced a simpler and more universal language for map scale. The Greenwich Prime Meridian was established. Developments in map making continued until the 20th century when advanced mapmaking (cartographic) techniques were invented. The advanced techniques included Aerial photographs, computers, electronic distance-measuring instruments, inertial navigation systems, remote sensing and applications of space science which have extended the horizons of cartography (http://myweb.unomaha.edu/~gtesmer/History.htm).

The website http://www.henry-davis.com/maps/ancient contends that the human activity of graphically translating a person's perception of his/her world is now generally recognised as a universally acquired skill and one that pre-dates virtually all other forms of written communication. Set in this pre-literate context and subjected to the ravages of time, the identification of any artifact as "the oldest map", in any definitive sense, becomes an elusive task. Nevertheless, searching for the earliest forms of cartography is a continuing effort of considerable interest and fascination. These discoveries provide not only chronological benchmarks and information about geographical features and perceptions thereof, but they also verify the ubiquitous nature of mapping, help to elucidate cultural differences and influences. The discoveries also provide valuable data

for tracing conceptual evolution in graphic presentations, and enable examination of relationships to more contemporary mapping.

In the same vein, Wilford (1981), also argued that the character and technology of mapmaking may have changed over the centuries, but the potential of maps has not. Maps embody a perspective of that which is known and a perception of that which may be worth knowing.

2.5 The Influence of Physics and Mathematics on the Academic Discipline of Geography

Almost all of our academic disciplines, including geography, have tremendously been influenced by physics and mathematics, especially that influence generally called the Newtonian Worldview whose dominant metaphor was the "world as a machine". The phrase "physical geography" denotes the point that 'physical' comes from 'physics.' Like Galileo, Rene Descartes believed that the language of (human and physical) nature was mathematics. The desire to describe geographical phenomena in mathematical terms—including mappable phenomena in this case—has been prevalent since the 16^{th}—17^{th} centuries todate. Therefore, scientific cartography and mapwork have had a strong dosage of physics and mathematics ever since.

According to Capra (1983), Galileo was the first to combine scientific experimentation with the use of mathematical language to formulate the laws of nature he discovered and is, therefore, considered the father of modern science. Capra (1983), further points out that Galileo contended that philosophy (science) is written in that great book which ever lies before our eyes; but we cannot understand it if we first do not learn the language and characters in which it is written. This language is mathematics, and the characters are

triangles, circles, and other geometric figures. In short, Galileo emphasised the mathematical description of nature.

Capra (1983) further explained that like Galileo, Descartes also believed that the language of nature—"that great book which ever lies before our eyes"—was mathematics, and his desire to describe nature in mathematical terms led him to his most celebrated discovery, analytic geometry. Descartes' grand scheme of working involved reducing all physical phenomena to exact mathematical relationships. Descartes gave scientific thought its general framework—the view of nature as a perfect machine, governed by exact mathematical laws. In this regard mapwork in geography has so much mathematical dosage based on Rene Descartes' influence that it has what is sometimes referred to as the Cartesian coordinate system. The word Cartesian comes from Descartes. Capra (1983), concluded that Descartes' 'marvellous science' involved analytic thought which attempted to give a precise account of all natural phenomena in one single system of mechanical principles.

The implications of Galileo's and Descartes' theses about understanding the language and characters in which nature is written are crucial to issues of classroom practice related to mapwork which is the focus of this study. First, they are a wake up call to teachers of geography in High schools to assess the mathematical content behind the maps they are using and, consequently, enable their pupils to acquire the same language and appreciate the reasoning (genesis) behind certain figures, symbols and concepts of the maps they are using. Second, they raise questions about the physical (from physics) and mathematical abilities of our pupils who take geography and their capacity to deal with mapwork which has some high dosage of mathematical content and language.

2.6 Brief History of Ordnance Survey (OS) Maps

This subsection focuses on ordnance survey maps from Britain because of the following reasons: first, Britain was once Zambia's (Northern Rhodesia's) colonial master. Consequently, a lot of what is currently in the Zambian curriculum is a legacy of the horse and rider relationship that Zambia and Britain once traversed on. Second, the ordnance survey map is still being used in the Zambian School certificate Geography paper 1 mapwork examination though the maps are currently based on Zimbabwe, another former colony of Britain. Third, the way these maps are formulated reflect who is calling the shots behind the scenes (i.e. by determining the content of maps that are used in school certificate examination in Zambia). ECZ still gives contracts to Ordinance Survey to prepare maps for it.

Ordnance Survey (OS) was founded in 1791. The early task of OS was to map Britain and Ireland for purposes of military intelligence, the former initially at the scale of one inch to the mile (1:63,360) and the latter at six inches to the mile (1:10,560). In the mid-19th century, very detailed larger scale maps were introduced, and such detailed planimetric mapping has remained a feature of OS mission to the present day [http://uk.encarta.msn.com].

Ordnance Survey (OS), with its headquarters at Southampton in England, is the national mapping agency for Great Britain. Northern Ireland is now mapped separately by Ordnance Survey of Belfast, Northern Ireland, while the governments of the Isle of Man and the Channel Islands commission their own mapping (usually from Ordnance Survey). OS is a government department, operating since 1990 as an Executive Agency, and is

responsible for the official surveying and topographic mapping of Great Britain and for disseminating topographic information in the form of maps and digital data to a wide variety of users [http://uk.encarta.msn.com].

The website http://www.galway.ie/en/Services/Library/1842OSMaps/ points out that Ordnance Survey was established in Britain in 1791 and that in 1824 the Survey established its Irish headquarters in Dublin. The Ordnance Survey took its name from the Board of Ordnance which is a military organisation. Field surveys were carried out by men of the Royal Engineers who were based in various barracks around the country. They had to determine the boundaries of over 60,000 townlands and standardised the names of each of them. The maps were drawn on a scale of 6 inches to one mile and published between 1833 and 1846. The Public Record Office of Northern Ireland website states that this massive undertaking ensured that Ireland was surveyed and mapped with a degree of thoroughness and accuracy unique for its time in the world. In addition, the Irish Historical Mapping Archive website states that it was a remarkable feat by remarkable men and the accuracy they attained is still marvelled at today. The process involved both innovation and ingenuity.

The next subsection of this chapter discusses dimensions of maps and mapwork.

2.7 Dimensions of Maps and Mapwork

As alluded to earlier on in the chapter, it is important to have a subsection that discusses other pertinent issues surrounding dimensions of maps and mapwork with a view to relating them to mapwork pedagogy and findings of this study. This section of this chapter is important in order for the reader to be holistically grounded in various issues of

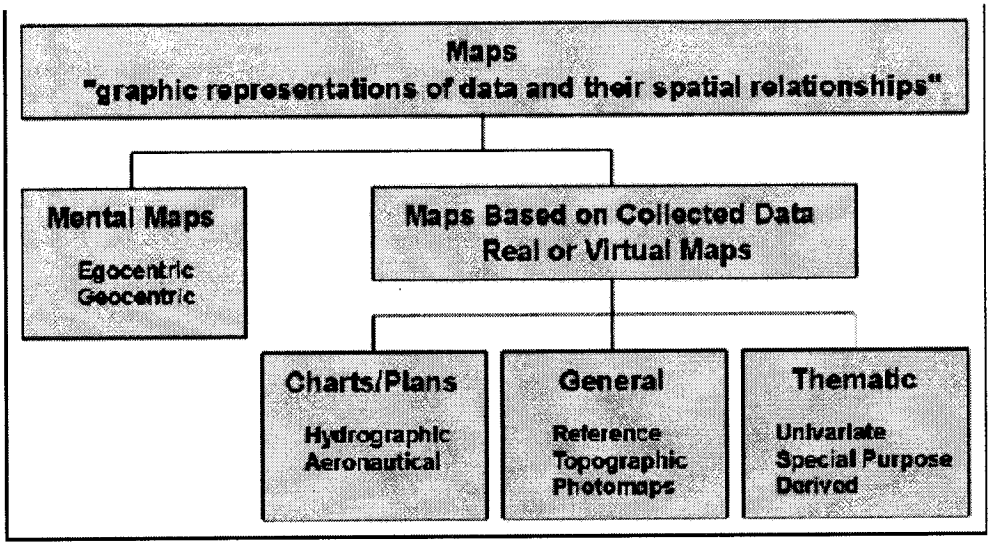
maps and mapwork. The researcher will make comments at appropriate opportunities on the implications of the points advanced on each sub-heading with regard to this study.

2.7.1 Different Types of Maps

Being a representation of the real world on a limited size of paper, a map is usually restricted as to what can be shown on it. In making this selection, the map maker (cartographer) has to select what to show and what to leave out. The map maker is guided by what the main purpose of the map is, such as being for road making, a topographical representation or as a thematic map. A road map emphasises roads and towns but little else, while a topographic map, also called a general map, shows as much of the landscape, elevations, roads and towns to mention but a few. A thematic map is designed to depict a specific theme such as the population of various magisterial districts, the occurrence of crime in different districts or annual rainfall [http://w3sli.wcape.gov.za/surveys/Mapping/mapuse.htm].

Other types of maps include genetic maps, geologic maps, geographic maps, phase maps, computer maps, mental maps - the list goes on. Chancellor (2004), also acknowledged that there are many kinds of maps. Among others, she listed underwater maps (called charts for helping boats to follow routes and avoid dangers), weather maps (to show what the weather is like in a particular place) and space maps or star charts (made by Astronomers-people who study stars). Bus or train maps (to help travellers plan their journeys on public transport), tourist maps (illustrating the landmarks in a city) and street maps (useful when walking or driving). Figure 11 shows how different types of maps are categorised.

Figure 11: Categorisation of different types of maps



Source: http://www.fes.uwaterloo.ca/crs/geog165/maps.htm

Songguang (2005:7) has a complementary outline of types of maps available as manifested below:

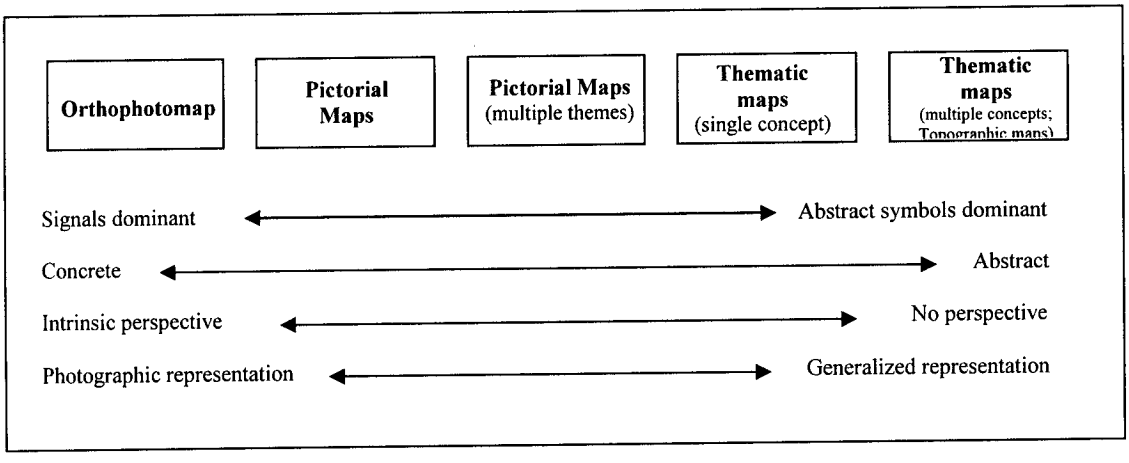
- ***Mental Maps***
- ***Real Maps***
    - Planimetric Maps: Surface maps with no relief features, e.g. street maps
    - Topographic Maps: Contour lines used to portray shape and elevation of the land.
    - Thematic Maps
        - ⇒ Dot distribution maps
        - ⇒ Chloropleth maps
        - ⇒ Proportionate circle maps
        - ⇒ Isoline maps

⇒ Flow maps

- ***Cartograms***: Maps created by substituting a different standard of measurement for distance or area.
- ***Statistical Maps***: Conveys distance between real world geographical locations based on calculated values
- ***Special Purpose Maps***: (e.g. historical maps, geologic maps, weather forecasting maps and so on).
- ***Cartographic Animations***
- ***Remotely-sensed Maps***
  - Arial photographs
  - Sound-based radar imagery
  - Light-based radar imagery

Regarding the discourse on the types of maps, Gerber & Wilson, (1984) contended that the sophistication of the map is linked to the degree of abstraction of the signs drawn on them. Therefore, one can then classify different map types (e.g. illustrated above) according to their levels of abstraction as shown in Figure 12 below:

Figure 12: Continuum of map types based on the abstractness of their signs



Source: Gerber & Wilson (1984:147) (also found in Board (1967:705)

The illustrations above just go to show how much of the different types of maps teachers and pupils do not know because the current practice in Zambian High Schools puts emphasis on Topographical maps (also called Ordnance Survey maps) for purposes of examination. By not including other map types, teachers deny pupils the opportunity to exercise their mental faculties for manipulating other types of maps. There is need for teachers and pupils to know the different types of maps available, and that their uses cannot be over-emphasised since design determines purpose. The list of different types of maps is endless and if one ventured into explaining the intricacies of each one of them, then, that would be another dissertation.

2.7.2 Functions of maps

Freitag (1993), point out that the most comprehensive attempt to articulate types of maps' functions had been the paper by Papay (1973) which built on the paper by Board (1967). Papay (1973) specified two sets of broad functions with further sub-functions. (1) Invariant functions of every cartographic representation including (a) Information carrier

(b) Explanatory reflection; (2) Variant functions of specific cartographic representations including (a) communication; (b) information gaining (knowledge transfer function); (c) the behavior steering function with subsets of advertising; orientation; and the decision function. The expression 'Invariant functions,' according to Carter (1988), means that any and all maps carry information and reflect some explanation of the world being represented by that map.

Freitag (1993), built on this base to distinguish four variant functions of maps: (i) The cognitive function encompasses all processes and operations and all models which generate and enhance spatial knowledge. All processes of map analysis, transformations, generalisation, simulations, animations, and so on should be listed here, if possible in a sequence of operations leading from near-reality models to very abstract models of space; (ii) The communication function, which includes demonstration, encompasses all processes and operations of spatial knowledge transfer from a map maker to a user. It may be divided into several sub-functions according to the extent of transferred knowledge, the level of pre-knowledge, and the form and means of knowledge transfer. Educational communication, mass media communication, academic communication, administrative communication represent the dimensions of this function; (iii) The decision support function encompasses all processes and operations which based on the evaluation of spatial phenomena result in spatial decisions and spatial actions. Examples of these types of functions include navigation, planning, and persuasion; (iv) The social function encompasses all processes which result not in spatial, but in social behavior and actions. One form of this involves the professional map maker in relation to other persons in the mapping process, including the users. Maps can also be seen as tools of

social power, exercised through the access or the denial of access to spatial information, through copyrights or the monopoly on mapping equipment. Then there is the ability to consider mapping as a cultural activity.

In summary, Freitag (1993) argues for two Invariant functions and four Variant functions of maps. Invariant functions of maps (cartographic representations, models) include (1) Carrying information and; (2) Reflecting an explanation of what is there. Variant functions of maps (cartographic representations, models) include (1) Cognitively creating and/or enhancing spatial knowledge (2) Communication of spatial knowledge to the user (3) Decision support leading to action (4) Social and behavior changes related to map use. It must be noted that how well these functions work depends in large part on the ability of the map user to comprehend and process the visual information.

In similar fashion as Freitag (1993), Catling (1980) postulated that maps perform four very useful functions namely: (a) the prime function of a map as a locational document. This enables people to pinpoint where places and events occur; (b) the second use of a map as a route finding or route displaying document. In performing this function the map user relies on the map to discover three things and these are (i) in which direction to go; (ii) how far the journey is; (iii) some assessment of how long it will take (This researcher wishes to add that a map could also help one decide the best means of transport to get there); (c) the third value of the map lies in the information that the user can glean, to a moderate extent, of the features and character of an area. The map reader may want to know something of the look of a place, of its shape and extent, and try to picture the landscape to him/herself. The foregoing three functions of maps illustrate the main

everyday uses of maps. They also indicate the main point about maps, which is that they are all, in their own way, as specialist documents. The purpose a map serves depends on the maker and the user.

To make the most of the use to which one wishes to put a map, it is essential to have the right map, which is to say that (d) the fourth function of maps is that they (maps) perform different functions. There are a growing number of people who use maps to store, analyse and display information, not just about roads or landscape, but of diseases, land use, spheres of influence, people's attitudes to places, and the like. Maps which are used for specific purposes, to display particular or certain sorts of information are called thematic maps. In one sense, all maps are thematic, but the term is generally applied to maps which show only limited information about a place or an area, and which are used to pass on specific facts or enable detailed analysis of an area to be made. In essence, thematic maps are aimed at specialist interpreters of places, such as geographers, town planners, geologists and all others who wish to have particular information available in map form (Catling, 1980).

The issue raised by Freitag (1993) are significant to this study because the variant and invariant functions of maps are issues that geography teachers and pupils could capitalise on and explore further to appreciate the fact that maps have unlimited uses unlike the usual locational functions 'sung' always by teachers and pupils alike. The significance of Catling's (1980) observations is that the functions he outlined are in tandem with what some of the pupil respondents pointed out when asked to indicate how maps would be

useful to them after leaving school. The only challenging part is the fourth function which did not come out strongly in pupils' submissions.

The website http://w3sli.wcape.gov.za/surveys/Mapping/mapuse.htm, in the same vein, points out that maps can be used to establish a lot of valuable information for the map reader or user. The website contends that position (location), spatial relationships as well as distance, direction and area can be established from a map. A map gives the location or position of places or features. The positions are usually given by the co-ordinates of the place, either as the Cartesian co-ordinates (x,y) in metres or as geographical co-ordinates (latitude and longitude) in degrees, minutes and seconds. The co-ordinates can be measured using the co-ordinate grid shown at set intervals along the borders of the map. The map user can, for example, find out that the position of Cape Town is 33°56' South latitude, 18°25' East longitude.

A map gives us the spatial relationship between features. For example: What province is the neighbour of another province? Which side of the road is the river on? Is there a dam on the farm? Where is the nearest railway station? We can determine a lot of information from a map such as distances, directions and areas. We can measure the distance from Johannesburg to Durban, determine that Pretoria is to the north of Johannesburg, or calculate the size of the Gauteng province. In determining distances and areas the scale of the map has to be taken into consideration. Directions are based on true north, but if one is using a magnetic compass then it must be remembered that the compass needle points to magnetic north, which is different from true north. The difference between the

magnetic north and the true north is called the magnetic declination [http://w3sli.wcape.gov.za/surveys/Mapping/mapuse.htm].

The significance of the arguments put forward by the website just cited above is that issues of location (four and six figure grid references), spatial relationships, distance, direction and area are some of the mapwork topics that were put forward to pupil respondents in order for them to ascertain which ones they found easiest and most difficult. Furthermore, the pupils' questionnaire had a question asking pupil respondents to suggest ways in which mapwork could be useful to them after leaving school. Some of the responses from pupil respondents in relation to how mapwork would be useful to them after school included locating places and features (20.1 per cent), estimating distance (5.5 per cent), finding direction (6.2 per cent) and making decisions where to settle (spatial relationships), the latter representing 1.8 per cent.

In the same line of discourse as above, Foote and Crum (1995) stated that maps are perhaps as fundamental to society as language and the written word. They are the pre-eminent means of recording and communicating information about the location and spatial characteristics of the natural world and of society and culture. Some would say that the use of maps distinguishes geography from all other disciplines. The truth is that maps, though of special concern to geographers, are used throughout the sciences and humanities and in virtually every aspect of day-to-day life. Millions of maps are produced and used annually throughout the world by scientists, scholars, governments and businesses to meet environmental, economic, political and social needs. Just as indicated earlier on that maps are not the preserve of geography, Clarke (2000) observes that maps

are pertinent in environmental science and related endeavours and he outlined the following five points to explain the importance of maps as scientific tools in the social sciences. Maps:

- allow us to visualise things we can't see.
- help us to recognise patterns.
- attempt at higher level of truthfulness (test of mental maps).
- permit further quantification.
- are much more efficient form of communication and data archival than verbal communication.

But words with maps can be far more powerful as a vehicle for scholarly exposition than the same words without maps (Monmonier, 1993). It is important to note that the role of maps in academia is to **complement** textual works, and not to replace them. Kulhavy et al. (1993) concluded that geographic maps actually help increase the recall of textual memory.

Wood (1992), also underscored the fact that many cartographers have reflected on the important role played by maps in society. He contended that maps may gain their value in society in three ways: (i) as a way of recording and storing information. Governments, businesses and society at large must store large quantities of information about the environment and the location of natural resources, capital assets, and people to mention but a few. Included are plat, parcel and cadastral maps to record property, maps of society's infrastructure or utilities for water, power, and telephone as well as transportation and census maps of population; (ii) as a means of analysing locational distributions and spatial patterns. Maps let us recognise spatial distributions and

relationships and make it possible for us to visualise and, hence, conceptualise patterns and processes that operate through space; (iii) as a method of presenting information and communicating findings. Maps allow us to convey information and findings that are difficult to express verbally. Maps can also be used to convince and persuade, or even to propagandise [Wood, 1992]. Basically Woods, too, is trying to convey the significance of the communicative function of maps. Weeden (1997), also outlined similar functions of maps as Woods (1992) except he added the function of problem solving (i.e. by interpreting or inferring from the information provided).

To conclude the discussion on the function and uses of maps, Carter (1988) cautions on the importance of appreciating the six dimensions to an understanding of how and why maps are used. By looking at each of these dimensions we might be able to improve on the ways maps are used. The dimensions are presented as follows: (i) the users of maps (who include individual users as consumers and producers as users), (ii) the uses of maps (which include aspects of reading, analysis, interpretation, tasks in using maps and functions of map use), (iii) the environments in which maps are used, (iv) the nature of the map or maps being used and (vi) communities of map users and (vi) the societal aspects of map use and abuse.

What is significant about each of these six dimensions is that each one of them has an effect on how maps are produced and interpreted by makers and users respectively. Some maps have just been designed for propaganda purposes. What is of notable significance to this study is with respect to the environments in which maps are used (point no 3 above). The findings of this study revealed that most pupils had not been taken on a field trip,

specifically, to learn aspects of mapwork. This meant that maps in the selected High schools, in the few instances they were used, were only utilised in the classroom environment thereby making them too theoretical or abstract.

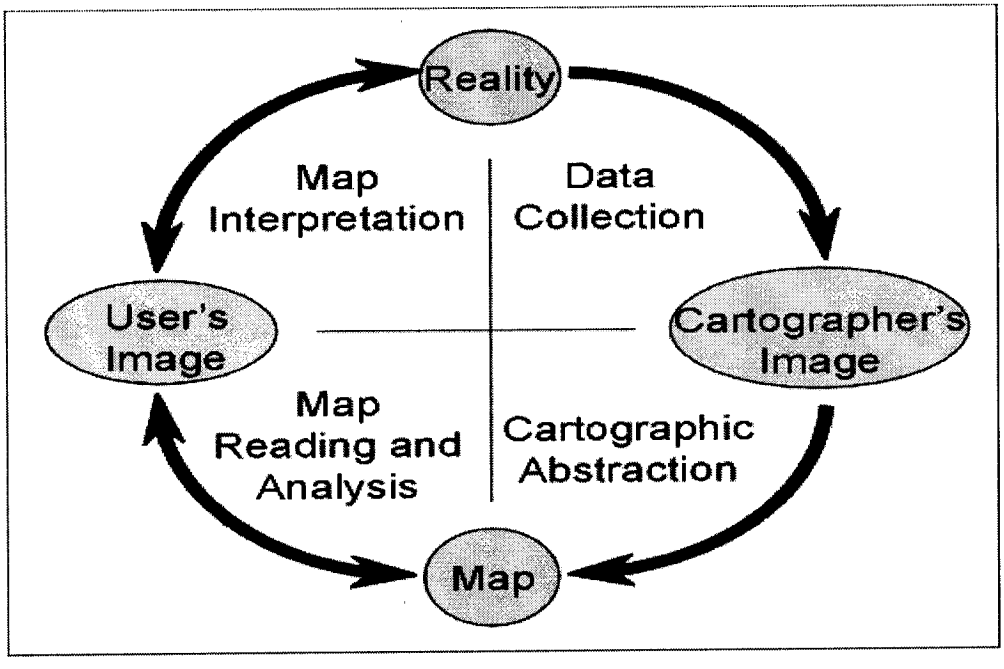
In trying to harmonise the dissonance that may result by teaching maps abstractly to pupils, the website http://www.ilstu.edu/~jrcarter/mapuse/index.htm advises that teachers of geography should introduce the concept of maps as macroscopes to pupils. Macroscopes are instruments that make large objects look smaller so that we can gain perspective about them— the opposite of microscopes. On the other hand, Microscopes let us blow up a molecule to see what cannot be seen with the human eye, while macroscopes let us reduce the world to see what cannot be seen with the human eye. Maps are macroscopes which are used primarily to represent spatial phenomena across the Earth's surface, although maps are not limited to the Earth, to a surface, nor to reality. Thinking of a map as a macroscope with the attributes of scale, projection and symbolisation sets the standard to discuss map use. [http://www.ilstu.edu/~jrcarter/mapuse/index.htm]

It is this aspect of reducing the world (large world) or reality to something that is abstract that brings in distortion and consequently complaints from some pupils that maps are difficult and complicated. What this means is that indeed some maps could be complicated due to workmanship and the terrain being depicted, especially in the case of ordnance survey maps. Teachers of geography would do well to acquaint themselves to the concept of maps as macroscopes as a basis for their introductory work to other mapwork skills.

2.7.3 The Cartographic Communication Process

The website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm points out that the cartographic communication process depicted diagrammatically below displays a common recognition of the separation between map making and map use (interpretation), but still emphasises the close relationship between these processes by treating them as components of a communication system. Effective use of maps requires understanding of the nature of maps and the mapping process while good map design requires understanding of how the maps will be used. The communications model also serves to emphasise that map use is not simply the reverse of map making but requires a distinct set of skills. The diagram also differentiates between map makers or cartographers from map users or interpretors. A map makes a document to be used by a map interpreter who, in this case, is the learner or teacher.

Figure 13: Diagram showing the Cartographic Communication Process

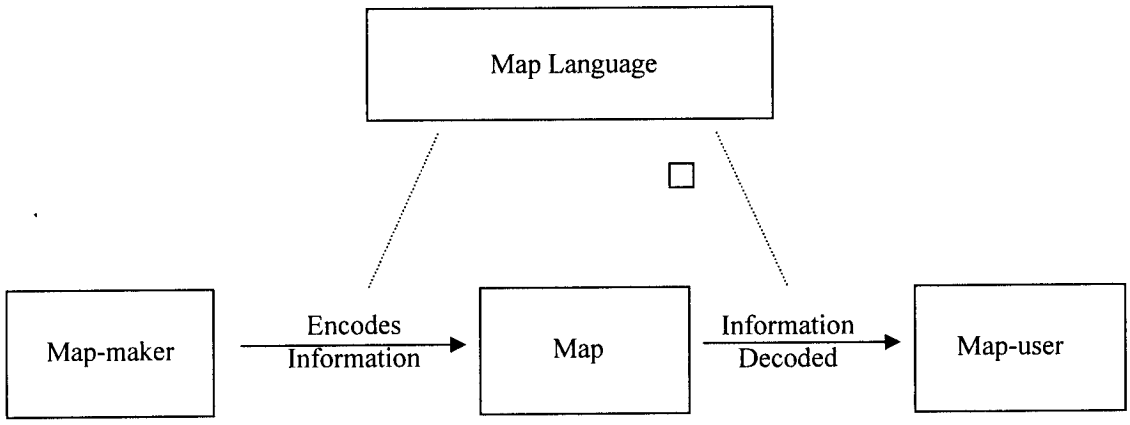


Source: http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm

The website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm further contends that Cartographic communication is a special form of graphic communication which differs from verbal communication. Verbal communication is sequential. Ideas are presented in a sequential fashion, allowing the writer or speaker to control the order in which information is conveyed. The emphasis is on parts linked by logic. In contrast, maps are synoptic, presenting information in a holistic fashion. The map user receives all of the information at once. Thus the map maker is unable to control the order in which information is received except by using map design to emphasize the most important information.

The separation of map use (interpretation) from map making introduces the possibility of distortion in cartographic communication. Anything which interferes with the transmission of the information from the map maker to the map user can be considered noise. Noise may enter the process at any point: the cartographer may have a poor conception of the subject matter of the map or may make poor design choices; problems may arise in printing the map, resulting in poor registration, poor line quality or poor colour reproduction; the map user may read the map under poor lighting conditions or may have poor map reading skills. Any of these sources of noise can influence the effectiveness with which the cartographer's conception of reality is transmitted to the map user. In the same vein as Figure 14 above, Gerber and Wilson (1984) presented a simplified cartographic communication system as manifested in Figure 15.

Figure 14: Simplified cartographic communication system



Source: Gerber and Wilson (1984:149)

With respect to the significance of the aforementioned discussion and figures to this study, it is important to underline that if maps are considered as a model of communication similar to language, the implication is that since language skills require sharpening by constant practice, the same would be true of mapwork skills in High schools. It is sad to note, however, that there is far too little or no practice in mapwork skills as established from the findings of this study in selected High schools on the Copperbelt Province.

2.7.4 Concepts of Map Reading, Map Analysis and Map Interpretation

Muehrcke and Kimerling (2001) contended that there are a number of different ways to look at map uses. These authors examined map use in terms of Map Reading, Analysis and Interpretation. Regarding map Reading, they postulated that to read a map, one has to translate its features into a mental image of the environment. The first step is to identify map symbols. The map reader must make a creative effort to translate the world of the

map into an image of the real world, for there is a large gap between the two. Much of what exists in the environment has been left off the map, while many things on the map do not occur in reality. The website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm, in the same line of thought as above, acknowledges that map use is a learned process which requires use of a variety of skills. In order to use maps effectively, one must understand the rules and conventions governing cartographic representation of information. Otherwise, it will be difficult to extract meaning from maps. Map use involves map reading, analysis and interpretation. Map reading is the first step and involves determining what map makers have depicted and how they have gone about it. Map reading requires a variety of skills. These skills are discussed further in part 2.7.8.

Muehrcke and Kimerling (2001) further argued that the goal of map analysis is to analyse and describe spatial structure and relations in order to reduce the muddle of information of a map to some sort of order so that one can understand it and describe it to other people. Analysis can be done visually where use of such terms as hilly, steep or dense, or can be done more objectively using quantitative techniques. The same authors further contended that map analysis gives descriptions, not explanations or interpretations and that analysing a map's geometry is designed to facilitate map interpretation, not substitute for it. Map analysis merely converts the complex patterns of symbols into usable form. A fascinating thing about map analysis is that it helps, in a sense, get more out of a map than was put into it. When map makers show a few features in proper spatial relationship, they allow the reader to determine all sorts of things—directions, distances, densities, and so on, that they may not have had specifically in mind. In the same line of trajectory, the website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm

explains that map analysis involves identifying interesting spatial patterns (e.g. areas of concentration of some phenomena). This may be done through visual analysis of the map, but can involve use of statistical techniques such as point pattern analysis or calculation of measures of spatial auto-correlation. Much of the meaning of a map is derived from locational information (i.e. the juxtaposition of related features). Recognition of spatial structure is most important to map interpretation.

Regarding map interpretation, Muehrcke and Kimerling (2001), pointed out that it involves noticing unusual or interesting patterns and seeking explanations for them. But they caution that answers to reader's questions will not often be immediately obvious. The map can include only enough clues to provide the reader with touchstones, starting points for discovery. This is because, they contended, maps are springboards for the imagination, trigger devices to set the reader questioning and inspired one to search for answers. The same authors further explained that intuition is an important part of map interpretation, just as it is in interpreting a book, a poem, or a painting. Map interpretation, then, is a complex, creative act. Everything the reader has learned about map reading and analysis will be put to use. In fact, everything the reader has learned throughout his/her life will be helpful. For interpretation requires an understanding of more than maps. One must have some knowledge of the features depicted on the map. Indeed, many persons read, analyse and interpret maps everyday [Muehrcke and Kimerling, 2001].

The website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm, in similar discourse as Muehrcke and Kimerling (2001) above, states that map interpretation attempts to explain

the spatial patterns revealed by the map. Typically this requires relating new information contained in the map to the user's image of the environment. If the map has been well designed, this should result in enhanced understanding of spatial patterns and causal processes.

In a somewhat similar fashion (i.e. similar to what has been pointed out by Muehrcke, Muehrcke and Kimerling (2001) above), Ormerling (1999) identified four levels of tasks in relation to map use and these were first order, second order, third order and fourth order tasks. First Order tasks that relate phenomena to the Earth's surface: what is at A, where are the borders for B, what is the shape of C? Second Order tasks describe interrelationships between individual map objects that make up the phenomena (horizontal relationships). How does the occurrence of A at site M compare to that of A at site N? How do you get from D to E? Third Order tasks involve situations where different phenomena are related to one another, or, where one phenomena is related to a third dimension, be it height above sea level or time. What is the spatio-temporal trend of phenomenon F studied over area A? Fourth Order tasks relate secondary or tertiary relationships with each other. An example would be to compare population numbers with the number of teachers for an area over time. Then you might use maps to compare the changes in the population of teachers' ratio to the changes in average income [Ormerling, 1999].

The significance of Ormerling's (1999), Muehrcke's and Kimerling's (2001) and the website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm's approach to this study is to remind map practitioners or end users that map reading is a process that has skills that

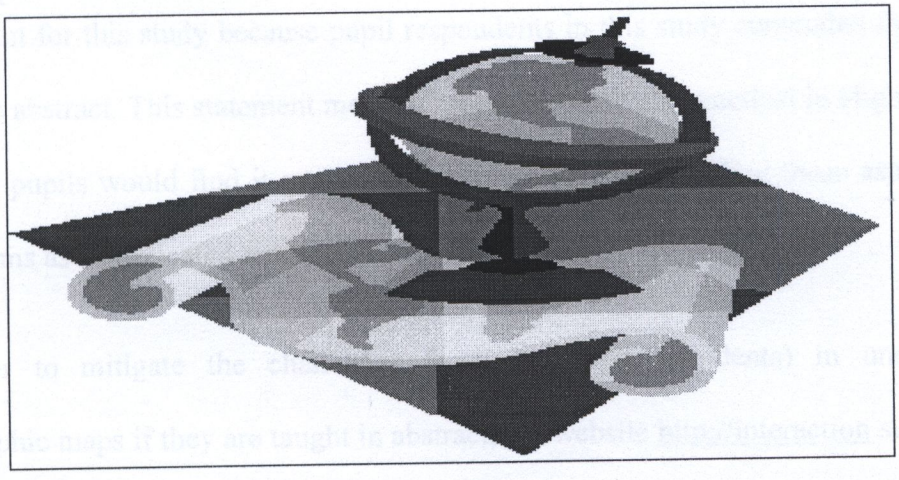
need to gradually develop and cannot just be hurriedly taught, for instance, when nearing exam time as the case was found in most High schools in the study. Secondly, it must be noted that Ormeling's four levels of tasks in relation to map use are parallels of Muehrcke and Kimberling's (2001) map reading, map analysis and map interpretation in 2.7.4 above. It is important to note that pupils may find it easy to manipulate map reading tasks (stage), but start facing challenges in map analysis and worse still, in map interpretation tasks. In the same vein, under Ormeling's (1999) levels of tasks in relation to map use, pupils may find first and second order tasks less challenging than third and fourth order tasks. If map interpretation as implied by Muehrcke and Kimerling (2001) and the website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm seems to be subjective or intuitive, the challenge in our High schools is how to enable pupils reach higher levels of map analysis and map interpretation or higher order tasks of thinking by practicing to think or argue in a subjectively logical manner in the context of their image of the environment.

2.7.5 The Concept, uses and challenges of Topographic Maps

The word topographic is derived from two Greek words-"topo" meaning "place" and "graphos," meaning "drawn or written." Simply, this could be interpreted to mean that topographic maps are a drawing of a place. According to http://interactive, a topographic map is a representation of a three-dimensional surface on a flat surface. The contour lines of such maps, sometimes called "level lines, join points of equal elevation. The closer together the contour lines appear on a topographic map, the steeper the slope (assuming constant intervals between contour lines). Topographic maps have a variety of uses, from planning the best routes for a hike to determining a location of a school or an airport

[http://interaction]. Regarding the challenges or difficulties that students may face when dealing with topographic maps, the website http://interactive contends that learning to use a topographic map is a difficult skill because it requires students to visualise a three-dimensional surface from a flat piece of paper. See the illustration in figure 15 below. The website goes to conclude and advise that students need both practice and imagination to learn to visualise hills and valleys from the contour lines on a topographic map. In the same vein, the website http://mac.usgs.gov/isb/pubs/booklets/topo/topo.htm argues that topographic maps show a three-dimensional world in two dimensions by using contour lines. Many people have trouble reading these maps because they have mountains and valleys represented with concentric circles and lines. The later website further postulates that a map is not a photocopy of the earth's surface. It can show many things that a picture cannot show, and as a result a map looks different in many ways from a photograph of the earth's surface.

Figure 15: A three dimensional world (earth) on a two-dimensional paper



Source: unknown

The whole idea of visualising a three- dimensional surface into two dimensions is what seems to be one of the challenges that our pupils face. This is worsened by the fact that most of the pupils in the study complained that they had not been taught mapwork or if they were taught then it was just barely near exam time. According to a point cited above, mapwork is a skill that requires constant practice, imagination and patience.

In the same line of argument, Azar (2002) contended that in order to grasp complicated maps, children must understand two concepts namely, representation (i.e. the idea that an object on a map stands for something in the real world) and spatial correspondence (i.e. the concept that spatial features of a representation are related in systematic ways to spatial features of the world). Spatial correspondences include (i.e. scale, the concept that a map is proportionally smaller than the real world; viewing angle, the concept that a map depicts the world from a specified position, usually from the top down); and viewing azimuth (i.e. the concept that a map shows space from a certain direction, commonly using north as the top of the page).

The arguments by Azar (2002) and the websites just cited in the paragraphs earlier are significant for this study because pupil respondents in this study contended that teachers were too abstract. This statement meant if mapwork was very practical in High schools in Zambia, pupils would find it easy to comprehend (grasp) including those aspects which Azar terms as complicated maps.

In order to mitigate the challenges faced by pupils (students) in understanding topographic maps if they are taught in abstract, the website http://interaction suggests that topographic maps should be taught in relation to geographic themes. Firstly, using a

topographic map can give students a clear understanding of the physical and human-made characteristics of a location (clear understanding of the characteristics of a location). Secondly, topographic maps allow for a clear understanding of such physical features (e.g. mountains and canyons). Thirdly, by using topographic maps, students can see why things are where they are. Students can see how a people have adapted to the physical characteristics of a particular location (understanding relationships within given places). Fourthly, by using topographic maps students can begin to understand how the topography of a location influences human activities within that area (e.g. transportation and communication) and with the rest of the world (understanding issues of movement and inter-connectedness) [http://interaction].

The significance of the discussion above is that it is a challenge to teachers of geography to align their mapwork lessons to the bigger picture of geographic themes and not in isolation that is, how geographic themes can be expressed using maps and how maps can be used to express geographic themes.

2.7.6 Factors Affecting the Value of Maps

According to Jolly (2006), the value of a map is affected by supply and demand, and ultimately reduces to an agreement between buyer and seller. However, it is possible to make some generalisations which may be helpful in estimating prices. Two broad groups of factors affect the value of a map, one dealing with the identity of the map, and the other with its condition. Factors related to the identity of the map will be presented first and these include: (i) the age of the map, (ii) rarity, (iii) size, (iv) the map maker, (v) aesthetic qualities, (vi) regions depicted, and (vii) historical importance. The factors

related to the condition of the map include: (i) grading, (ii) staining, (iii) rips/tears, (iv) backing, (v) colouring, (vi) margins, and (vii) creases.

The factors affecting the value of maps alluded to above are significant to this study in that teachers of geography should be knowledgeable enough to expose pupils in High schools to the fact that maps are not just flat pieces of paper representing part of the earths surface, but to underscore the fact that maps have value attached to them. In the same vein, teachers of geography would be in a better position to advise their school managers and Heads of Departments on the best maps to get depending on the function they want to put them to in order to enhance pupils' map skills.

2.7.7 Steps Involved in the Map Making Process

The website http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm states that the map making process can be grouped into three main stages: (i) data collection, organization, and manipulation; (ii) map design and artwork preparation; and (iii) map reproduction. In the first stage, data must be collected from existing maps, aerial photographs or digital imagery, documents (e.g. legal descriptions of property boundaries, historical documents, and so on), field work or questionnaire surveys. The data must be organised so that we can understand whatever phenomena are being represented and the data must be manipulated into a form which is suitable for mapping. This may involve aggregating data to some specified set of spatial units, calculating percentages, densities or other summary measures from the raw data. Data have to be organised and simplified to ensure effective communication. If the map contains too much detail it will be difficult to read

and understand so it is not a good map. But it must contain enough detail to get the required idea across. What you leave out is often as important as what you put in.

The second stage involves design and preparation of maps, charts, plans and graphs. Many decisions go into the design of an effective map. These include the selection of the geographic features and thematic attributes to be represented on the map. These choices depend upon the purpose of the map, the intended audience, and the cartographer's understanding of the phenomena being represented. For maps of large areas such as provinces, countries, continents or the world, it is important to choose an appropriate map projection which minimizes distortion of the geometric properties of the region being mapped. Determination of the level of detail required, given the purpose of the map, is a critical decision which is closely related to the choice of map scale. A small scale map can show a large area but little detail while a large scale map shows a smaller area but with more detail [http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm].

The third stage is map reproduction. Map reproduction methods act as a constraint on the map design process. How many copies of the map will be required? This is the major determinant of the reproduction methods used. Black and white and colour laser printing and Xeroxing technology are cost effective if only a few copies are required. If large numbers of maps are required then offset printing may be the only practical alternative. In some instances, distribution of maps in digital format on tape, disk or CD-ROM is replacing or at least reducing the need for printed maps [http://www.fes.uwaterloo.ca/crs/geog165/ccom.htm].

The discourse above, on steps involved in map making process, is significant to this study because it is expected that teachers of geography in High schools should have some basic knowledge of map making to enable them make some basic maps of their local environments. And if they are able to make basic maps of their local environments, then, it is not far fetched to postulate that they could read and interpret their own maps first and, eventually, find it less challenging to read and interpret maps made by other people. This is one challenging weakness to the current Zambian School Certificate Geography mapwork component in that it emphasises reading and interpreting maps made by other people and foreign companies, in this case, Ordnance Survey of Britain that supplies maps to Zambia based on Zimbabwe.

2.7.8 Things One Needs to Know When Reading a Map

The website http://erg.usgs.gov/isb/pubs/teachers-packets/mapshow/lesson2.html outlines some key points that users of maps need to bear in mind when using maps and these are:

- Mapmakers use of north, south, east, and west to describe direction.
- Mapmakers usually orient their maps to show north at the top.
- It is possible to describe the relationship of one place to another. One place is north, south, east, or west of another place. This kind of orientation is known as relative location.
- Using longitude and latitude, a grid of imaginary lines created by geographers, it is possible to identify the absolute location of any point on the Earth's surface.
- The relationship between a distance on the map and the corresponding distance on the ground is known as scale.

- Using the distance scale, it is possible to determine the actual distance on the ground between two points shown on a map.
- Geographers use the terms "large-scale" and "small-scale" to describe the amount of area on the ground covered by a map. A large-scale map shows a small land area in great detail. A small-scale map shows less detail, but a larger land area.

In the same line of trajectory as alluded to above, Muir (1985) outlined seven complementary skills that are suitable in mapwork instruction and these are:

- Understanding symbols,
- Perceiving an aerial perspective,
- Determining direction,
- Computing distance,
- Locating places on a map,
- Becoming acquainted with scale and,
- Reading elevation maps.

Other map skills that are essential as outlined by Muir (1985) included;

- Working with map projections,
- Understanding time zones,
- Use of latitudes and longitudes and,
- Comparison of different map scales and interpretation involving two or more maps.

Before commenting on the significance of the skills outlined above, it is important to note that they are framed on the principle of expanding horizons (i.e. from concrete to abstract). The implications of the aforementioned to mapwork pedagogy are that teachers

of geography in High schools would do well not only to expose pupils to the principles above, but also allow pupils to apply the principles in different, new and practical situations in real life, of course, bearing in mind the principle of expanding horizons.

Additionally, it is vital also in the same line of reasoning of things one needs to know when reading a map, to introduce the notion of eight interrelated properties that all maps share in common as propagated by Gerber and Wilson (1984:149-50) below:

- Orthogonal or Plan View
  - ✓ All maps are made from an orthogonal, head-down, aerial view. Thus, maps are the only form of graphic communication that have no intrinsic perspective.
- Spatial Relationships
  - ✓ The concept of absolute space means that the spatial relationship among any objects marked on a map is not affected by the position of the one viewing the map. Hence, the location of any object on the map can be determined by triangulating any three coordinates.
- Proportion
  - ✓ The map represents a reduced spatial unit of the earth's surface. Thus relative proportion must be maintained in any map through a system of scaling. This is similar to the concept of maps as macroscopes.
- Generalisation
  - ✓ Maps are not a photographic representation of the earth's surface and hence it is not possible to show all the features of a particular

area. Mapmakers therefore generalise about certain areas and features on the map.

- Abstraction
  - ✓ The features on a map are represented through a series of signs and symbols. A certain level of abstraction thus exists on all maps depending on the mapmaker's choice of sign system.
- Isomorphic Properties
  - ✓ Maps always retain a structural relationship similar to the area they represent (e.g. rivers, mountains and towns are always drawn in the same pattern as they occur on the earth's surface). The map is always isomorphic to the area it represents.
- Map Language
  - ✓ Through the use of signs and signifiers, a language of map comprehension must be transmitted to the map reader.
- A Way of Reading
  - ✓ There is no standard way of reading a map, unlike a piece of text where sequence is emphasized. The way map users approach reading maps is influenced by their knowledge of the area mapped, the way they scan the map, and signs on the map to mention but a few.

Gerber and Wilson (1984) advise that from their research essential skills needed for mapping (namely: orientation, direction, scale, distance, location, relative location, distribution, symbolisition, map comparison, inferencing, map language, map drawing,

projection, legend, map title, observing landscape and the globe as a model) may be developed using four of the key properties above, namely plan view, arrangement, proportion and map language. This is because, they argue, the ability to understand maps must be cultivated since it is not inborn. This must be organised through pupils having hands on experience (unlike the case was with most selected schools in this study whose pupils and teachers indicated that they had not had any lesson dealing with mapwork outside the classroom).

The next chapter discusses the methodology of this study.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

This chapter reviews literature related to various issues of High school pupils' attitudes towards mapwork. There is a lot of literature surrounding the subject of maps and the issues behind their production and usage as noted in chapter two. However, there is scanty literature on scholars who have done studies directly on High school pupils' attitudes towards mapwork. This chapter endeavours to outline works that have been done in line with students' attitudes towards geography and maps in general as well as maps and geographic education with a view to linking them to the findings of this study. Subsections 3.2, 3.3 and others focus on geography as a field of study (instead of mapwork as such) because geography is the main subject where mapwork is taught and learnt. Moreover, as already stated above, literature focusing directly on attitudes to mapwork was scanty. In this situation, this researcher was forced to review literature on geography which is commonly associated, in the minds of many people, with maps. In this regard, the next section begins with students' perceptions of geography in England and Wales in general.

3.2 Students' Perception of Geography in England and Wales

Weeden (2007) pointed out that geography was a popular optional subject of choice in England and Wales at age 14, but between 1996 and 2006 numbers entering for the General Certificate of Secondary Education (GCSE) examination in geography declined by 29.4%. The decline in numbers appeared to be due to a complex interaction between individual students' perceptions of geography, the quality of teaching as well as learning

in geography departments and whole-school option choice system. By whole-school option choice system, I mean the optional subjects available in a particular school for pupils to choose from. Weeden (2007) also pointed out the influence of three main factors on subject choice, namely interest, usefulness and success. Weeden's (2007) findings about geography being a popular subject choice in England and Wales are consistent with the findings of this study as shown in table 5, where most of the High school pupils indicated that they took geography as an optional subject. Additionally, this study established that there was concern from both pupils and teachers of geography over the way mapwork was being neglected by teachers of geography. This is similar to one of Weeden's (2007) reasons given for the decline in pupil numbers in geography where the concern raised was over the quality of teaching and learning in geography departments in England and Wales.

Furthermore, the whole-school option system (optional subjects available in a school) was one of the factors that led to the decline in pupil numbers in England and Wales. With respect to selected High schools on the Copperbelt, in this study, what was notable was that there was stiff competition between geography as an optional subject and other optional subjects, such as Religious Education, History and the newly introduced Civic Education, all of which were offered in the Social Sciences departments. Unless there is serious change in the way geography is handled in High schools, Civic Education is likely to overtake geography. What was holding Civic Education from overtaking geography in High schools, at the time of research, was that it was still being piloted in some schools before it could be established fully.

3.3 Teacher and community perceptions of geography in Australia

According to Noorden (2001) as cited by Conolly (2001), Jacaranda recently conducted a series of surveys to test teacher perceptions of geography in Australia. Teachers were asked to identify which aspects of geography parents and the community would most readily identify as being geographic. According to the 580 teacher respondents (the equivalent of one in five Australian schools) the wider community still viewed geography as a subject where teachers found out about: (i) countries of the world (94%); (ii) learnt map reading (85%); (iii) understood about weather and climate (62%); (iv) learnt about physical geography (59%); and (v) discovered Australian environments (46%).

Noorden (2001) further notes, from his study, that geography was not seen to be about: (i) concern for social issues (6%); (ii) taking action on conservation issues (14%); and (iii) conservation and management (22%). He suggests that his next step would be to test exactly what parents and the community thought about geography, through surveys taken home by students. The results would need to be carefully analysed. If, for example, 90% of the community saw geography as a subject where we find out about countries of the world, we might be tempted to think that this was a narrow or out dated perception of geography. We could also look at this response from a positive perspective, namely, that this is a unique aspect of our subject that is readily identified with geography and therefore, how can we use it to our advantage in the promotion of geography?

Noorden's (2001) findings and argument just cited have implications for this study revelation. Just like Noorden's (2001) study, this study also involved teachers of geography and used a survey to capture data. However, there are two points of departure between Noorden's (2001) study and this study. First, the number of geography teachers

involved in Noorden's (2001) study in Australia was far more than those involved in selected High schools on the Copperbelt. Second, this study focused on asking which aspects of mapwork pupils and teachers perceived most challenging while Noorden's survey was trying to identify, from the perspective of geography teachers, which aspects of geography parents and the community most readily identified as being geographic. Interestingly, learning map reading was ranked second among the responses given about what was perceived geographic in Australia. Small wonder, some pupils in this study indicated that geography would be meaningless without mapwork when asked whether they would enjoy geography without mapwork.

Noorden's (2007) proposed future study to find out exactly what parents and the community thought about geography and his suggestion that based on what the response is from the respondents, the most important geography topics and skills for careers need to be identified, is a challenge for future research in Geographic Education in Zambia. First, it is a challenge for future research in Geographic Education to establish what parents, the community and employers in Zambia consider as important topics in geography that would help graduates to fit easily and appropriately in the world of work. This, Noorden (2001) advises, must be done from the point of view of the employer. Second, future research could also focus on establishing from various employers what it is about mapwork that should be improved to make it more relevant for the ever changing world of work in Zambia.

In the same vein, a study by Brook (1977) also examined the general attitudes toward geography held by junior, high school, and undergraduate student teachers. The variables

included education level, gender, and students' individual conceptualisations of geography as possible influences on attitude. Brooks' (1977) summary of the factors that influenced student teachers attitudes towards geography differ with this study's factors that influenced High school pupils' attitudes towards mapwork in that she identified education level, gender as two of the factors which were not part of this study's findings. Probably because she was focusing on tertiary level students, while this study focused on High school pupils. The only similarity is the factor of students' individual conceptualisations of geography which is closer to the pupil factor in this study (see figure 18 and part 6.3). Suffice to say that Brooks was trying to identify variables that influenced attitudes held by junior, high school, and undergraduate student teachers towards geography.

3.4 Students' attitudes towards geography in Turkey

Demirkaya and Aribas (2004) conducted a study to investigate the attitudes of third year students at the pre-service Social Studies Education Department towards geography course. A 30 – item geography attitude scale prepared to find out students' attitudes towards the geography course was administrated to 160 third year students at the Pre-service Social Studies Education Department of the Faculty of Burdur Education. It was found out that attitudes of students at the Pre-service Social Studies Education department towards geography were generally positive. There were no significant gender differences found between male and female students' attitudes towards geography. Nevertheless, there was a significant difference in students' attitudes with respect to the type of the teaching programme (primary programme or secondary programme).

The findings of Demirkaya's and Aribas' (2004) to this study are significant in that their study revealed that attitudes of students at the Pre-service Social Studies Education department towards geography were generally positive, just as this study also revealed that the majority of pupils (89.4 %) in the selected High schools had positive attitudes towards geography as a subject. Regarding pupils' attitudes towards mapwork, though not the subject of focus of Demirkaya's and Aribas' study, this study established that more pupils had positive attitudes toward mapwork (see table 7). But what is equally interesting of the findings of this study is that gender differences found between male and female High school pupils' attitudes towards geography and mapwork were negligible as manifested in tables 6 and 7 respectively. Though gender differences were not the focus of this study, this is consistent with the findings of Demirkaya and Aribas (2004). The point of departure, however, is that these authors focused on students' attitudes towards geography at a tertiary level unlike this study which focused on pupils' attitudes towards mapwork as a component of geography among selected High school pupils.

3.5 Reasons for poor performance in mapwork

The website http://planet.uwc.ac.za.nisl/gis/assignment suggests that after acknowledging that one of the greatest problems in teaching geography is what has traditionally been called mapwork, Professor John Earle of The University of Witwatersrand, in Johannesburg, became the lead supervisor of a student (not named) who did a study to establish why competence in topographic map use was so poor in South Africa. The findings of the study included the following:

- lack of maps of any kind in under-resourced schools,

- inadequate teacher training,
- mechanistic approach to 'mapwork' rather than investigative map use,
- no clear progression of skill development,
- lack of opportunities to practice map skills,
- a few specialised texts for teaching map use were available but were very expensive,
- many geography school textbooks took the approach that teaching how maps were made would assist in learning to read maps. The latter is like teaching how tennis rackets are manufactured and expecting to produce star tennis players.

Interestingly enough, nothing on pupils' attitudes towards mapwork comes out in this study. Hence, the justification to go ahead with the study under study to fill in the information gap vis –a-vis High school pupils' attitudes towards mapwork. However, there are several parallels in this South African study to that of this research as shown in table 17. For instance, the South African study shows that one of the reasons for poor performance in mapwork is the mechanistic approach to mapwork rather than investigative map use. This is consistent with the findings of this study in table 17, point number 16, where High school pupils cited poor methodology in mapwork as one of the reasons for poor performance in mapwork. Second, the South African study also cited lack of maps of any kind in under resourced schools and the availability of only a few very expensive specialised texts for teaching map use as a reason for poor performance. This also resonates with table 43, point number 5, of this study where teachers of geography indicated (complained of) lack of teaching materials as one of the reasons why pupils perform poorly in mapwork.

Third, the South African study attributes inadequate teacher training to poor performance in mapwork. This is in tandem with point number 3, in table 43 where geography teachers in this study indicated that teachers themselves were poorly trained. Interestingly, this point is also echoed by pupils as shown in table 17, point 15 where they also cited shortage of trained geography teachers. For lack of a better word, it appears inadequate teacher training in mapwork is a "naked truth" that is even known to the learners themselves in selected High schools on the Zambian Copperbelt. Fourth, the South African study attributes poor performance in mapwork to lack of opportunities to practice map skills. This point too is in consonant with the findings of this study in table 17, point number 3 and table 43, point number 1 as both pupil and teacher respondents respectively indicated that there was little or no practice in mapwork in selected High schools on the Zambian Copperbelt. Fifth, the South African study also indicated that there was no clear progression of skills development. This is similar to points 6 and 8, in table 17 where pupils revealed that they were not taught/exposed to mapwork and not all mapwork topics were covered respectively, and table 43, point number 6 where teachers of geography admitted that mapwork was not taught at senior level. This meant there was no clear progression, continuity and consolidation of mapwork skills introduced at junior level.

On the contrary, the last bulleted point on the reasons for poor performance in mapwork outlined above was not reflected in the reasons why pupils performed poorly on the Zambian Copperbelt. Instead, most High schools on the Copperbelt complained of school textbooks that were too outdated. This was crudely put by teachers as follows: "some

mapwork books available were older than pupils themselves." Furthermore, this study brought out other reasons why pupils performed poorly in mapwork which this South African study did not bring out such as:

- Teachers barely taught
- Least priority accorded to mapwork by pupils in the exam
- Time given to mapwork in the examination was not enough for critical thinking
- Difficulties understanding mapwork
- Failure to understand exam instructions
- Casual approach to mapwork by teachers
- Laziness by pupils
- Mapwork was confusing
- Too many involving calculations
- Tendency to examine on foreign based maps.

What can be learnt from the findings of both the South African and this study is that, when looked at critically, the findings are complementary and can build on each others' strengths and differences. Suffice to say that the South African study helps to authenticate the findings of this study with respect to the reasons for High school pupils' dismal performance in mapwork and the reverse is true.

3.6 Image of School Geography in Nigeria

In his preamble to the study on the image of school geography in Nigeria, Okpala (2000), noted that any subject that is not termed essential at any educational level in any educational system has to work extra hard for its continued existence. Such a subject may

be phased out if it lacks clientele (students). It could also be relegated to the background if an allied subject is thought to be more relevant to citizens at that point in time. Geography has experienced these situations. The former was experienced in Nigeria when the number of geography students fell to less than five in a school, and geography was removed from the timetable for economic reasons (Willmer, 1966) as cited by Okpala (2000). The latter was the case in the United States of America from the 1960 to the 1980s when social studies replaced geography in many schools. It is therefore important that geographers periodically evaluate the image of the subject in order to work out plans for survival. It is with that in mind that Okpala (2000) embarked on a study to establish the image of geography as perceived by students and school certificate geography examiners in order to realistically search for ways forward. Comment on Okpala's (2000) discourse on the image of school geography in Nigeria will be made later.

Okpala (2000) also pointed out that at the inception of formal education in Nigeria, geography was a popular subject in schools and colleges. Many found it challenging as a bridge between the arts and the sciences. The popularity of geography at university and rapid production of high quality graduates led to the formation of the Nigerian Geographical Association (NGA) in 1957. From Nigerian independence in 1960 up to 1984, changes occurred in the Nigerian educational system which affected geography adversely. With independence, the educational system was reorganised. Subjects were grouped to ensure a balanced education. Geography belonged to a group called general subjects. Other subjects in this group were literature in English, history, religious knowledge, economics, commerce and government. Other subject groupings were

English, mathematics, the sciences and vocational subjects. Students were supposed to choose at least one out of each group and register for a minimum of six subjects in the school certificate examination. The system paid attention to the basic subjects, English and mathematics, and to the sciences because of emphasis on science and technology. The sciences were encouraged by school management and government in terms of allowances, equipment and in-service training support.

The popularity of geography decreased steadily within this period. The reasons elicited for such a decrease included: the wide scope of the subject; poor previous results in the certificate examination; poor teaching methods; lack of qualified teachers; and geography not being regarded as a science subject. Examiners in geography were laid off as the number of candidates decreased steadily. (Apparently, this study did not find out from pupils why they liked or did not like mapwork). The educational system then, the 6-3-3-4 (six years primary, three junior secondary, three senior and four university) which started in 1976 and reached senior secondary level in 1985 favoured geography. With the operation of the two-tier secondary system in 1992, rather than the former five, geography became exclusively a senior secondary subject while social studies became compulsory at the junior secondary level. The position of geography was strengthened as it became a core subject, though optional, in the group with literature in English, and history. A great advantage in this current grouping is that the greatest threat to geography, that is economics, no longer belongs to this subject group. Students, in the past, preferred economics to geography because of its less intensive content and better results. As of 2000, most science students chose geography (Okpala, 2000).

According to Okpala (2000), information on the state of geography in Nigeria was elicited from 426 undergraduates of the University of Nigeria, Nsukka who were in senior secondary classes between 1989 and 1997, and 43 school certificate geography examiners who graded the May/June 1998 examination scripts at the Nsukka centre. The undergraduates were made up of 112 students of the Department of Geography, 163 non-geography students who sat for geography in school certificate examinations, and 151 students who did not study geography in secondary school. The purpose of the survey was to elicit the experiences of these students with school geography in terms of the benefits they derived from studying it; the problems they encountered; and suggestions made for its improvement.

Okpala (2000) further reported that non-geography students found what they learnt in school geography useful in everyday life and in the course they were pursuing in the university. They indicated the need to take some elective courses from the geography department. Engineering students indicated mainly map work and physical geography while economics students indicated human geography as being useful. Students who had not studied geography at all in secondary school regretted it considerably. Their willingness to recommend geography to secondary students was very high. Geography students found school geography useful for university geography, but commented about poor foundations in mapwork and elementary survey work. Information on whether or not to study geography was gained mainly through friends and peers.

When contacted to comment on the problems students faced in geography, examiners indicated that poor teaching (too theoretical) and lack of information on job prospects for

geography graduates were the major observations by students. Examiners blamed poor teaching, lack of teaching materials and lack of incentives for geography teachers. Examiners indicated improved enrolment in school certificate geography but with many poorly performing schools, so that some performances were school dependent. Studying geography in university because of failure to gain admission to the course of choice (i.e. through shopping) was noticeable. The intention to change to another department if released by the geography department was substantial (Okpala, 2000).

From a historical perspective on geographical education and the findings reported above, Okpala (2000) concluded, it could be argued that geography in Nigeria was currently in a better position than it was before the establishment of the 6-3-3-4 system of education. While this was true to a large extent, it could be argued that as a non-essential subject, the place of geography in the secondary school programme in Nigeria was unstable because geography no longer attracted the best brains. It could be argued that geography in higher education still attracted the less able students as was the case in the 1970s. Regrettably, these students are not committed to the subject. Every year, the Department of Geography and Sub-Department of Science (Geographical) Education are unable to fill their admissions quota due to a lack of students. The vacancies are therefore advertised and are filled by admitted candidates who fall short of the requirements of departments of their first choice.

Okpala's (2000) study is significant to this study for the following reasons: First, it brings to our attention the volatile and vulnerable situation in which geography as a subject finds itself in most courtiers including United Sates of America (USA), Nigeria and even

Zambia, when allied subjects compete for the hearts of students as alluded to earlier in this chapter regarding the stiff competition geography faces from other social science subjects such as Religious Education, History and Civic Education in Zambia. Interestingly, even at the University of Zambia (UNZA) in the School of Education, Geography Education has not been offered for the 2007 and 2008 academic calendars. Regarding when the next intake will be admitted, only the powers that be know better. The allied course to Geography Education is Environmental Education, but given chance to choose between Geography Education and Environmental Education, most graduate students confess they would go for the latter. For instance, in the academic year 2006, the Environmental Education Course at UNZA had enrolled a total of seven post graduate students compared to three only for Geography Education. Among the reasons given for not choosing Geography, students indicated that Environmental Education was more marketable and less challenging than Geography. In other words, the awkward situation geography finds itself in is not exclusive to high schools but is endemic at UNZA too.

Second, Okpala (2000) admonishes that geographers should occasionally evaluate the perception of geography among various stakeholders with a view to mapping out a survival plan for the subject in order to sustain its relevance in the 21st century. This suggestion should not just be blushed aside by any serious and well meaning geographers in Zambia. Third, Okpala (2000) explains that at the peak of the popularity of geography in Nigeria, the Nigerian geographical Association (NGA) in 1957 and its leadership attracted quality geographers. With respect to the Zambian situation, there is the Zambia Geographical Association (ZGA) which most geography teachers and students, sadly, just read about in books. They admit that they do not know its leadership, its headquarters, its

aims and objectives, membership and subscription fees to mention, but a few. This would have been one association that would have been actively mitigating some of the problems faced in the learning and teaching of geography in High schools and even encouraging teachers to embark on action research. Unfortunately, even the ZGA Journals that used to be published in the 70s and 80s are no longer seen. The latest copy this researcher has seen is dated 1989.

Fourth, this study revealed that geography was not a core subject in selected High schools, but was mostly taken as an optional subject. On the contrary, Okpala (2000) states that as of 2000, in Nigeria, geography had regained its position as a core subject, but optional. Fifth, Okpala (2000) sought to find out the benefits students had derived from studying school geography. This is similar to this study in that Table 19 shows High schools pupils suggestions on the perceived usefulness of mapwork after school. The only difference with this study is that Okpala's (2000) was dealing both geography and non-geography students at the university of Nigeria, while this study was dealing with high school pupils views before they went to a tertiary institution. For instance, in this study, some pupils suggested that mapwork would be useful in career development and further geographical studies. This is similar to Okpala's (2000) findings where a number of Geographers found what they had learnt in school geography useful in everyday life and in the courses they were taking. For instance, according to Okpala, engineering students found mapwork and physical geography useful to them in their programme. Okpala (2000) established that geography students found school geography useful for university geography, but complained about poor foundations in mapwork and elementary survey mapwork. This researcher believes it is this kind of feedback that

careers teachers and Geographic Education scholars need to research on to enhance linkages between what pupils are doing in schools and their area of future career developments in tertiary institutions. It would be interesting to carry out the same study with Engineering and other students at the University of Zambia to establish non-geography students' views of the usefulness of what they did in geography at High school level. What is sad from Okpala's (2000) study is that students got information about the choices they made to take or not to take geography from peers and not careers teachers. Hence, the need to enhance careers teachers' skills by not just restricting them to supervising exams and giving out results as well as certificates as the case was in Zambia at the time of this research.

Sixth, Okpala (2000) makes another interesting revelation that this researcher noted while in the field. Okpala (2000) points out that as a non-essential subject (non-compulsory), the place of geography in the secondary school in Nigeria is unstable because geography no longer attracts the best brains. In short, he argues that geography in higher education in Nigeria still attracts the less able students as was the case in the 1970s. This view is in tandem with the observation of this researcher that in selected High schools, Geography was mostly a preserve of those unable to meet the minimum requirements to take pure sciences and additional mathematics. It appears that this same decision to subject pupils who are weak in the pure sciences to the subject of geography that has a high dosage of physics and mathematics seems to explain the dismal performance of High school pupils in school certificate geography. Even at UNZA, there is a tendency by students of geography to complain about courses that have a high dosage of mathematics (e.g. Geo 272 Quantitative Techniques in Geography) to mention, but one. This just goes to

validate Okpala's (2000) observations about geography being offered to the less able students in Nigeria. In the same vein, this researcher noted that most students majoring in geography at UNZA, given chance, would go for courses that were in the category of Human geography than Physical geography related courses.

2.7 Geography and Mapwork at Abergwaun

The main findings of an inspectorate report done by Jones (2002) at Abergwaun school, in Wales, concluded that the attitudes of pupils towards geography and mapwork was satisfactory with pupils showing a good knowledge of their own locality and their studies of other countries. Their basic knowledge of mapwork was developing well, but pupils had yet to master the ability to apply skills they had learnt to new situations. The term satisfactory in the report is used to mean that good features outweighed some shortcomings. The findings of Jones (2002) are in tandem with those of this study which established, as manifested in Tables 6 and 7, that most of the pupils had a positive orientation towards geography and mapwork respectively. Yet, as the South African study noted, pupils lacked opportunities to practice map skills. However, in the case of Jones' (2002) findings in Wales, pupils were yet to master map reading skills (meaning teachers were doing something to help pupils master the skills), unlike the Zambian and South African situation where opportunities to practice and develop map skills were non-existent or negligible.

3.8 Maps and Geography

In a study done in Singapore, students' perception regarding the role of maps and geography was investigated. Songguang (2005) revealed that the majority of respondents

(62.5 %) indicated that maps were central to the discipline of geography. However, when asked further about the role of maps in physical and human geography respectively, more students (61.7 %) felt that maps played a central role in physical geography as compared to its human component (41.3 %). This is not surprising, Songguang (2005) commented, as many people associated maps with the physical landscape, even though there exists a great variety of maps (see part 2.7.1 in chapter 2) which are dedicated solely for depicting trends and relationships in the human environment. Most respondents (58.3 %) also concurred that maps were useful tools for 'seeing' the landscape. In general, it seemed that students with higher levels of formal education in Geography tended to agree strongly to the claims than students without (Songguang, 2005).

It is interesting to see also what students from outside the discipline of geography felt about the role of maps in geography and below are excerpts of two somewhat complimentary views as captured by Songguang (2005:35).

> [...] of course maps are important in geography. If geography students don't use maps, then how would they study all the rivers and mountains? They can't just go [to the field] and expect to be able to see everything from a bird [sic] eye view right?
>
> Ms H.SY (3rd Year ICM major)

> Yes, maps are important in Geography. [...] because maps show the physical features that forms the basis of geography. Maps also help people to find places, and without them, many geography students will not even be able to get to the places they want to study.
>
> Ms T. JX (2nd Year Sociology Major)

The findings of students' perception to the role of maps and geography are significant to this study in that the inclusion of students from outside the discipline of geography is the point of departure with this study, in that, this researchers' study did not include pupils

(respondents) who were not in geography classes. Yet, it is also important to note that Songguang's (2005) decision to get views from non-geography students resonates with the suggestions of Noorden (2001) to do a community survey to assess the perception of the wider community (i.e. employers' organisations about the relevance of certain skills and topics in geography). That is another area of future research that could be undertaken by other scholars in Zambia.

The findings of Songguang (2005) on students' perception to the role of maps and geography are further significant to this study in that they give scholars in Geography Education, a challenge to view the perception of non-geography students to geography so as to get an outsider's view point. This is similar to Noorden's (2001) view in Australia as acknowledged earlier in this chapter. The implication for this country is for teachers to be mindful of what outsiders (i.e. employers, parents and wider community), think of geography and mapwork as well as its relevance in industry in general other than just for fulfilling a curriculum function on the time table. The findings in Singapore that revealed that students acknowledged the centrality of maps in physical geography and that maps were useful tools for seeing the landscape resonate with the findings of this study as manifested in Table 8 where pupils ranked mapwork positively because it gave them knowledge of location, knowledge of places and features, knowledge of direction and distance (all of which are related to the physical landscape somehow).

2.9 Maps and Geographic Education

In the case of students' responses to the role of maps in Geographic Education, Songguang's (2005) survey reinforces the centrality of maps to the discipline as the

majority of respondents felt that all geography students should be able to read, interpret and use maps (51.3 %). The centrality of maps to geography is also consistent with the findings of this study as shown in Table 22, points 12, 13 and 14 where pupils indicated that geography would not be enjoyable without mapwork because: having map reading skills was vital, geography and mapwork were inseparable and that geography would be meaningless respectively. However, when asked if they have had sufficient training in map reading from their formal education in geography, the responses were more varied. Less than half (44.6 %)of the total respondents agreed that they had sufficient training in map reading skills, and a small proportion (3.8 %) felt strongly that they could have done with much more training in this aspect. There seemed to be a correlation between the level of formal training in Geography and the perceived amount of sufficiency in map skills (Songguang, 2005). On the contrary, pupils in this study indicated that their teachers did not teach mapwork as manifested in Table 21, point number 3. This meant our pupils could be graduating with insufficient training in map reading skills compared to the views of students in Singapore, the majority of whom indicated they had sufficient training in map reading skills.

These reactions, Songguang (2005) argues, were symptomatic of the fact that many geography teachers tended to focus their curricular time on teaching the theoretical aspects of geography, often neglecting the applied component of practical geography. This is also consistent with the findings of this study (see Table 30, point number 5) in that pupils indicated that they did not like the way their geography teachers taught mapwork because they were too theoretical or abstract. This meant at the end of the day pupils ended up with concepts they could not apply in real life. Contrasted with the

responses on the centrality of maps skills for geography students in Singapore, it seemed that there existed a dichotomy between the perceived learning needs of the students and the actual training they received to satisfy such a need. Such a situation was not unique to Singapore as Van Der Schee noted, in most Dutch geography school books, a lot of conceptual knowledge was presented to the students. However, a systematic training in acquiring and using that knowledge by means of concepts derived from geographic method seemed to be missing (1998: 76).

> I don't remember much about how my secondary school teacher taught maps [...] But I think that she didn't spend too much time on it cos [sic] there were more important topics to cover.
>
> Mr. L.L (3rd Year Computing Major)

According to Songguang (2005), the majority of respondents (83.3%) also felt that maps did indeed aid them in the study of the discipline. This is due to the graphic nature of maps for they can immediately show a student geographical patterns and distributions without having to rely on long textual sources. This point is also acknowledged by Clarke, 2000, Chapter 2. A map, thus, effectively serves as a tool of communication, to the reader, information about spatial phenomenon. The question on whether or not geography could be taught without using maps drew a varied response as the opinions were divided, with a slight majority (54.1%) feeling that maps were not absolutely critical to geographic pedagogy. Once again, the responses towards whether or not map skills are important to scoring a good grade in geography drew varied responses and no conclusive statement was made about this claim.

3.10 Map skills and practical usefulness

Regarding students' perceptions to the practical applications of map skills (i.e. whether or not students valued map skills outside of the confines of the geography lesson), Songguang (2005) contended, it was important to understand the non-curricular motivations for acquiring map reading skills for such notions are pertinent to the long term relevancy of map reading as a skill. Respondents in Singapore generally felt that map skills were still relevant in modern day society, with over 72% of them indicating "agree" or "strongly agree" on the surveys. However, when this notion was contextualised in the case of Singapore, the responses were much less certain with the bulk of responses falling into the middle spectrum of responses. When asked about whether map skills increased one's employability, over half of the respondents in Singapore felt that this was not the case and only 9.5 % of respondents thought that map skills could aid a student in finding a job. This is contrary to the perceived Western notion that the employability of geography students was enhanced by training in cartography and related subjects. Songguang (2005) further postulates that these findings were influenced by the apparent lack of jobs in Singapore which required specialised knowledge in cartography and Geographic Information Systems (GIS) training. These findings must be linked to wider issues of societal mores and economic demands which were not the focus of Songguang's study but constituted an interesting field of research on its own as cited by Songguang (2005:40) below:

> Why do you need a map in Singapore? You will never get lost and even if you do, you can easily walk to a nearby road and get a taxi. Maps are only for boy scouts and army soldiers who bash through jungles [...]
>
> Mr. T. QY (3rd Year Engineering Major)

Songguang's (2005) findings as illustrated above where 72% students indicated that map skills were still relevant are in tandem with the findings of this study in which pupils were asked to state whether mapwork was useful after leaving school as manifested in Table 19. This study revealed that 76.3 % of the pupils felt mapwork would be useful for various endeavours ranging from the common locative functions through to use in tourism, military service, decision making in business to career development and further geographical studies. In other words, 23.7 % of the pupils did not know how maps could be useful after leaving school, consequently, such pupils did not indicate suggestions.

The other point of departure of Songguang's (2005) study with this one is that he focused on the marketability or employability of students who had done cartography related courses in Singapore whereas as this study emphasised on High school pupils and how they perceived mapwork would be useful in general after leaving school. Suffice to say that Songguang's (2005) idea of finding out from the students themselves how they perceived the chances of marketability or employability in the job market is another area of study that researchers in Geographical Education could carry out in future studies.

In view of the discourse in this chapter on the literature available on the studies done in relation to geography and mapwork, there was still a gap regarding High school pupils' attitudes towards mapwork, factors influencing High school pupils' attitudes towards mapwork, and mapwork items High school pupils perceived most challenging. Hence - the motivation to go ahead with this study to add to the scanty data base of knowledge in Geography Education in Zambia.

The next chapter discusses the methodology used in this study.

CHAPTER FOUR

METHODOLOGY

4.1 Introduction

This chapter discusses the methodology used in this study under the headings: research design, target population, study sample, sampling procedure, research instruments, data collection, data collection procedure, challenges encountered during data collection, and data analysis.

4.2 Research Design

The study employed a survey design in which quantitative and qualitative data was collected using a questionnaire for both teacher and pupil respondents. Survey research was found to be appropriate for this study because it was aimed at collecting data on a wider area, in this case across 10 districts (i.e. Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Lufwanyama, Masaiti, Mpongwe, Mufulira and Ndola) that make up the Copperbelt province of Zambia. Specifically, data was collected from the following High Schools that were chosen by simple random sampling (i.e. by pick a lot system after shaking papers that bore names of each school in the district in a bow): Chililabombwe, Chikola, Kalulushi, Hellen Kaunda, Kalumbwa, Mpatamatu, Ibenga, Mpongwe, Kantanshi and Kansenshi. The Copperbelt province was chosen for the study because of the interesting geographical and communication interconnectedness of the districts and the manner they are spread. Secondly, the province was chosen because some districts were urban and others were rural (rural districts were Lufwanyama, Masaiti and Mpongwe). Above all, the province was chosen for the minimal economical costs in terms of carrying out the study.

4.3 Target Population

The study involved Grade 12 pupils and teachers from High schools on the Copperbelt Province of Zambia. According to the Directorate of Information and Planning (DIP, 2006), the Copperbelt Province had 58 High Schools distributed as follows: Chililabombwe 4, Chingola 5, Kalulushi 4, Kitwe 13, Luanshya 8, Lufwanyama 2, Masaiti 2, Mpongwe 2, Mufulira 7 and Ndola 11. Furthermore, the province had a total of 57,264 High school pupils (28,547 males and 28,717 females). Additionally, there were a total of about 4,362 High school teachers (1,935 males and 2,427 females).

4.4 Study Sample

The study had a total sample of 296 respondents selected from the following 10 High schools: Chililabombwe, Chikola, Kalulushi, Hellen Kaunda, Kalumbwa, Mpatamatu, Ibenga, Mpongwe, Kantanshi and Kansenshi. They were 274 pupils (155 females and 119 males) and 22 geography teachers (17 males and 15 females). On average there were about twenty-seven (27) High school pupil and two (2) geography teacher respondents in the study per school. Grade 12 High school pupils were chosen for the study because they were academically mature to respond to questions in the study with less difficulties. Secondly, Grade 12 High school pupils had experienced mapwork final examination at Grade 9 level and several mock exams at senior level. Geography teachers were selected because they were experts in the subject under study, and so could be relied upon to give reliable perspectives on mapwork in their respective High schools.

4.5 Sampling Procedure

The ten (10) High schools in the study were randomly sampled after all the fifty-eight (58) High schools in the Copperbelt province were classified or grouped according to districts with the help of the Planning and Research Unit of the Copperbelt Provincial Education Office. The High Schools in this study were chosen by simple random sampling (i.e. by pick a lot system after shaking papers that bore names of each school in the district in a bow). From the list of schools in each district only one was randomly picked. The pupils in the study sample per school were randomly selected but after purposively coming up with Grade 12 classes that took geography per school. The idea behind purposive sampling was to focus only on pupils and classes that took geography in each of the High schools selected in the study. Care was also taken to have a balanced representation from each of the Grade 12 classes that took geography per school. This means pupils that were in classes that took Geography all had a chance to be picked.

4.6 Research Instruments

Structured questionnaires with both closed and open ended questions were used to collect quantitative and qualitative information from Grade 12 High school pupils and geography teachers. Questionnaires were used because of their capacity to collect large chunks of information from a large number of respondents.

4.7 Data Collection

Primary data was collected during the first half of 2007 by using structured questionnaires. Secondary data was obtained from written materials and documents found in books, dissertations, journals, magazines, articles and the internet.

4.8 Data Collection Procedure

The researcher got a letter of introduction from the Assistant Dean Post Graduate, in the School of Education. The researcher then went to the Provincial Education Officer (PEO), Copperbelt Province, to introduce himself and got another letter of introduction to take to District Education Board Secretaries (DEBS) and High School Managers of schools in the Copperbelt. Upon arriving in the selected High schools, the researcher introduced himself and the topic of research to School Managers who referred him (the researcher) to the experts (i.e. teachers of Geography).

The researcher would then make an appointment on the appropriate day, time and venue to come and administer the questionnaires to the pupils taking geography in the selected schools. On the appointed day for each school, the researcher first explained the topic under study, read out the instructions and asked pupils to fill in the questionnaire. Most schools preferred letting the sampled pupils be with the researcher in the schools' halls or any vacant classroom to let them be free to express themselves. The researcher was available to explain to both pupils and teachers any questions that required clarity regarding their questionnaires. Whilst the pupil respondents were with the researcher, teacher respondents were also busy answering their questionnaires. At the end of each session the researcher thanked all the respondents and school managers for their time and indulgence.

4.9 Challenges Encountered during Data Collection

A number of challenges came up during data collection. First, some appointments with some schools had to be rescheduled to later dates due to unforeseen circumstances such

as sports days, absence of school managers and heavy rains, to mention but a few. Second, some questionnaires had to be refilled by some teacher respondents because they had misplaced the first ones. Third, transport logistics and connections to districts like Mpongwe, Masaiti and Lufwanyama, being rural districts, were very cumbersome. Fourth, the researcher was alone, without any research assistants, due to financial constraints. This meant the researcher had to shuffle to and from each of the ten districts on the Copperbelt, unassisted.

4.10 Data Analysis

The data collected was analysed quantitatively and qualitatively. Quantitative analysis was done through tables, graphs and percentages to help summarise and present the information professionally. Qualitative analysis of data was done by categorising the information into significant themes.

The next chapter presents the findings of this study.

CHAPTER FIVE

PRESENTATION OF FINDINGS

5.1 Introduction

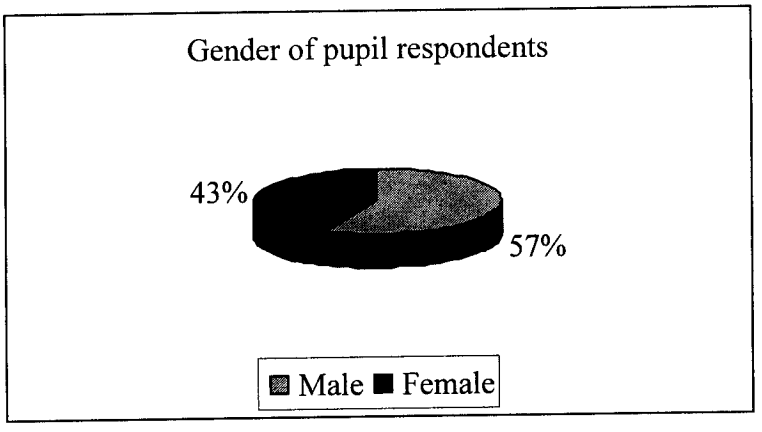
This chapter presents the findings of this study. The findings are presented in two parts, namely, Part A (Pupils' perspectives on mapwork) and Part B, (Teachers' perspectives on various aspects of mapwork). The study focused on capturing the views, opinions and experiences of High school pupils in geography classes and also teachers of geography on the Copperbelt. The results presented in this chapter were those obtained through questionnaires for both High School pupils of geography and teachers of geography. The results are presented separately for each category mentioned above. The pupils' and teachers' views, opinions and experiences are summarised into sub-themes which will be presented as figures or tables. Specific findings on each theme and aspect of the mapwork component are presented in the following pages.

5.2 PART A—PUPILS' PERSPECTIVES ON MAPWORK

5.2.1 Gender of pupil respondents

In order to give the reader an idea of the profile of pupil respondents in this study, in terms of gender, pupils were asked to state their gender (i.e. whether male or female) in the questionnaire. Figure 16 shows the profile of pupils in that respect.

Figure 16: Gender of pupil respondents.



From Figure 16, the higher percentage (57 per cent) of pupils in the study were female while the lower percentage (43 per cent) of pupils were male.

5.2.2 Pupil respondents by age

In order to give readers an insight into the age profile of pupil respondents in this study, pupils were asked to state their age in the questionnaire. The profile of pupils in terms of age is manifested in Table 2.

Table 2: Pupil respondents by age

AGE GROUPS	MALES	FEMALES	#	%
15—19 years	97	152	249	90.9
2O—24 years	22	3	25	9.1
TOTAL	119	155	274	100

Table 2 shows that the higher percentage (90.9 per cent) of the pupils' age group was between 15-19 years, while the lower percentage (9.1 per cent) of the age group was between 20-24 years.

5.2.3 Distribution of high schools and pupils by district

Pupil respondents were asked to indicate the names of their schools instead of their names to maintain confidentiality. Furthermore, names of schools were also meant to give readers an overview of schools, the numbers of pupils that were involved in this study and the districts they hailed from on the Copperbelt province. In this regard, the data generated is presented in Table 3.

Table 3: Distribution of High schools and pupil by district

NO	HIGH SCHOOL SAMPLED	DISTRICT	PUPILS SAMPLED		#	%
			MALE	FEMALE		
1.	Chililabombwe High	Chililabombwe	19	18	37	13.5
2.	Chikola High	Chingola	19	18	37	13.5
3.	Kalulushi High	Kalulushi	12	12	24	8.8
4.	Hellen Kaunda High	Kitwe	0	26	26	9.5
5.	Kalumbwa High	Lufwanyama	11	8	19	6.9
6.	Mpatamatu High	Luanshya	13	15	28	10.2
7.	Ibenga High	Masaiti	0	20	20	7.2
8.	Mpongwe High	Mpongwe	18	12	30	10.9
9.	Kantanshi High	Mufulira	12	13	25	9.1
10.	Kansenshi High	Ndola	15	13	28	10.2
	TOTAL		119	155	274	99.8

In Table 3, the highest percentage (13.5 per cent) of pupils came from Chililabombwe and Chikola High schools respectively. The middle percentage (9.5 per cent) came from Hellen Kaunda High school, while the lowest percentage (6.9 per cent) came from Kalumbwa High school.

5.2.4 Types of school researched on

Pupil respondents were asked to state the category of schools they came from. This was meant to establish the profile of schools in the study. The results of this study, regarding the types of schools researched on, are presented in Table 4.

Table 4: Types of schools researched on

TYPES OF SCHOOLS	GENDER		#	%
	Male	Female		
GOVERNMENT	119	135	254	92.7
MISSION	0	20	20	7.3
TOTAL	119	155	274	100

Table 4 shows that the higher percentage (92.7 per cent) of pupils came from government schools, while the lower percentage (7.3 per cent) came from a mission school.

5.2.5 The status of geography in the school curriculum

In order to generate data on the status of geography in the school curriculum, pupil respondents were asked to state whether they took geography as a compulsory or optional subject. The results of this question are presented in Table 5.

Table 5: The status of geography in the school curriculum

STATUS OF GEOGRAPHY	GENDER		#	%
	Male	Female		
OPTIONAL	60	115	175	63.9
COMPULSORY	59	40	99	36.1
TOTAL	119	155	274	100

Table 5 shows that the higher percentage (63.9 per cent) of pupils indicated that geography was optional, while the lower percentage (36.1 per cent) indicated that geography was compulsory.

5.2.6 Ranking of geography as a subject

In order to generate data on the ranking of geography in the school curriculum, pupil respondents were asked to state whether they liked geography. The idea was to compare findings with other studies. The results of this question are presented in Table 6.

Table 6: Ranking of geography as a subject

RESPONSES	GENDER		#	%
	Male	Female		
YES	105	140	245	89.4
NO	14	15	29	10.6
TOTAL	119	155	274	100

Table 6 shows that the highest percentage (89.4 per cent) of pupils indicated that they liked geography, while the lowest percentage (10.6 per cent) indicated that they did not like geography.

5.2.7 Ranking of mapwork

One of the objectives (the first objective) of this study was to establish High school pupils' attitudes toward mapwork. In order to generate data regarding High school pupils' attitudes toward mapwork, pupil respondents were asked to state whether they liked mapwork. The results of this question are manifested in Table 7.

Table 7: Ranking of mapwork

RESPONSES	GENDER		#	%
	Male	Female		
YES	90	109	199	72.6
NO	29	46	75	27.4
TOTAL	119	155	274	100

Table 7 shows that the higher percentage (72.6 per cent) of the pupils indicated that they liked mapwork, while the lower percentage (27.4 per cent) indicated that they did not like mapwork.

5.2.8 Reasons for ranking of mapwork positively

Having established High school pupils' attitudes towards mapwork in Table 7, this study sought to establish the reasons for ranking of mapwork positively and negatively. The reasons for ranking of mapwork positively are presented first in Table 8.

Table 8: Reasons for ranking of mapwork positively

NO	REASONS FOR RANKING OF MAPWORK POSITIVELY	GENDER		#	%
		MALE	FEMALE		
1.	Enhanced Critical Thinking	6	6	12	6.3
2.	Gave Knowledge of Location	25	22	47	24.7
3.	Helped in day to day Life	2	0	2	1.1
4.	Gave Knowledge of places and features	27	43	70	36.8
5.	Gave Knowledge of Distance	2	0	2	1.1
6.	Gave Knowledge of Direction	1	0	1	0.5
7.	It was easy and exciting	16	19	35	18.4
8.	Gave higher marks	2	1	3	1.6
9.	It was educative	1	1	2	1.1
10.	Helped in Research	0	1	1	0.5
11.	Liked Geography	1	0	1	0.5
12.	No Reason	5	9	14	7.4
	TOTAL	88	102	190	100

In Table 8 above, the highest percentage (36.8 per cent) of pupils indicated that mapwork gave them knowledge of places and features. The middle percentage (1.6 per cent) of pupils indicated that mapwork gave them higher marks, while the lowest percentage (0.5 per cent each) indicated that mapwork gave them knowledge of direction, helped them in research and because they liked geography respectively.

5.2.9 Reasons for ranking of mapwork negatively

Having established High school pupils' reasons for ranking of mapwork positively in Table 8, this study also sought to get the reasons for ranking of mapwork negatively. The reasons for ranking of mapwork negatively are manifested in the Table 9.

Table 9: Reasons for ranking of mapwork negatively

NO	REASONS FOR RANKING MAPWORK NEGATIVELY	GENDER		#	%
		MALE	FEMALE		
1.	Did not understand mapwork	3	8	11	13.1
2.	Had never been taught	7	8	15	17.9
3.	It was very confusing	5	10	15	17.9
4.	It was boring	3	5	8	9.5
5.	It was time consuming)	2	6	8	9.5
6.	Difficult to answer	5	8	13	15.5
7.	It was very complicated	3	5	8	9.5
8.	Lacked materials	0	1	1	1.2
9.	No reason	3	2	5	6.0
	TOTAL	31	53	84	100.1

In Table 9, the highest percentage of pupils (17.9 per cent each) indicated that they had never been taught mapwork and that it was very confusing respectively. The middle percentage (9.5 per cent) indicated that mapwork was time consuming while the lowest percentage (1.2 per cent) indicated that they lacked materials.

5.2.10 Aspects of mapwork perceived very challenging by pupils

There was a question in the questionnaire asking pupil respondents to indicate aspects of mapwork they perceived very challenging. This was to prepare ground for the question in Table 14. The responses to aspects of mapwork pupils' perceived very challenging are presented in Table 10.

Table 10: Aspects of mapwork perceived very challenging by pupils

NO	MAPWORK ASPECTS PERCEIVED VERY CHALLENGING	GENDER		NUMBER OF RESPONSES	%
		Male	Female		
1.	Use of map symbols	33	47	80	4.9
2.	Calculation of scale	68	80	148	9.1
3.	Four figure grid reference	37	66	103	6.3
4.	Calculation of area	64	82	146	9.0
5.	Showing relief features using contours	63	74	137	8.4
6.	Calculation of gradient	71	91	162	10.0
7.	Six figure grid reference	46	77	123	7.6
8.	Calculating distance on a straight line	41	44	85	5.2
9.	Showing relationship between physical environment & human activities	49	68	117	7.2
10.	Calculating distance on a curved line	58	82	140	8.6
11.	Compass bearing	60	76	136	8.4
12.	Compass direction	29	60	89	5.5
13.	Drawing a cross-section(profile)	61	86	147	9.1
14.	Other	2	5	7	0.4
15.	None	3	1	4	0.2
	TOTAL	685	935	1624	99.9

In Table 10, the highest percentage of pupils (10.0 per cent) indicated that they perceived calculation of gradient very challenging. The middle percentage (7.6 per cent) indicated that six figure grid reference was very challenging while the lowest percentage (0.2 per cent) indicated that none of the mapwork aspects was very challenging.

5.2.11 Number of times mapwork was taught since Grade 10

Pupil respondents were also asked to indicate how many times they had learnt mapwork since Grade 10. This was meant to establish how much attention was given to mapwork by teachers and the contact between teachers and pupils, right from Grade 10. The results are manifested in Table 11.

Table 11: Number of times mapwork was taught since Grade 10

RESPONSES	GENDER		#	%
	Male	Female		
MORE THAN 10 TIMES	12	16	28	10.2
FIVE—TEN TIMES	16	15	31	11.3
LESS THAN FIVE TIMES	41	42	83	30.3
NEVER	50	82	132	48.2
TOTAL	119	155	274	100

In Table 11, the highest percentage of pupils (48.2 per cent) indicated that they had never learnt mapwork. The middle percentage (30.3 per cent) of pupils indicated that they learnt mapwork less than five times, while the lowest percentage (10.2 per cent) indicated that they had learnt mapwork more than 10 times.

5.2.12 Mapwork aspects covered with teachers since Grade 10

Having indicated the number of times they had learnt mapwork since Grade 10, pupil respondents were asked to indicate mapwork aspects they had covered with their geography teachers in the same period (i.e. since Grade 10). The results are manifested in the Table 12.

Table 12: Mapwork aspects covered with teachers since Grade 10.

NO	MAPWORK ASPECTS	GENDER		NUMBER OF RESPONSES	%
		Male	Female		
1.	Use of map symbols	42	52	94	12.9
2.	Calculation of scale	19	27	46	6.3
3.	Four figure grid reference	33	43	76	10.4
4.	Calculation of area	11	13	24	3.3
5.	Showing relief features using contours	18	30	48	6.6
6.	Calculation of gradient	14	11	25	3.4
7.	Six figure grid reference	30	41	71	9.7
8.	Calculating distance on a straight line	25	18	43	5.9
9.	Showing relationship between physical environment & human activities	15	29	44	6.0
10.	Calculating distance on a curved line	17	21	38	5.2
11.	Compass bearing	23	28	51	7.0
12.	Compass direction	17	25	42	5.8
13.	Drawing a cross-section(profile)	13	10	23	3.2
14.	Other	0	1	1	0.1
15.	None	44	59	103	14.1
	TOTAL	321	408	729	99.9

In Table 12, the highest percentage of pupils (14.1 per cent) indicated that they had covered none of the aspects in Table 12. The middle percentage (6.0 per cent) indicated that they had covered showing relationship between physical environment and human activities, while the lowest percentage (0.1 per cent) indicated that they had covered other aspects (i.e. settlement patterns).

5.2.13 The most challenging mapwork aspects to learn

The third objective of this study was to establish which aspects of mapwork pupil respondents perceived to be most challenging to learn. In this regard, pupils were asked to indicate the most challenging mapwork aspects to learn. The results of this question are presented in Table 13.

Table 13: The most challenging mapwork aspects to learn

NO	MAPWORK ASPECTS	GENDER		NUMBER OF RESPONSES	%
		Male	Female		
1.	Use of map symbols	3	4	7	2.6
2.	Calculation of scale	3	6	9	3.3
3.	Four figure grid reference	2	1	3	1.1
4.	Calculation of area	7	6	13	4.7
5.	Showing relief features using contours	10	8	18	6.6
6.	Calculation of gradient	10	12	22	8.0
7.	Six figure grid reference	12	22	34	12.4
8.	Calculating distance on a straight line	4	3	7	2.6
9.	Showing relationship between physical environment & human activities	8	10	18	4.7
10.	Calculating distance on a curved line	15	19	34	12.4
11.	Compass bearing	7	17	24	8.8
12.	Compass direction	6	4	10	3.6
13.	Drawing a cross-section(profile)	8	11	19	6.9
14.	Other	0	0	0	0
15.	Did not indicate any (none)	24	32	56	20.4
	TOTAL	119	155	274	98.1

In Table 13, surprisingly the highest percentage (20.4 per cent) of pupils were those that did not indicate that any mapwork aspects were challenging. The middle percentage (4.7

per cent) indicated that calculation of area was most challenging, while the lowest percentage (1.1 per cent) indicated that four figure grid reference was most challenging.

5.2.14 Reasons for perceiving certain mapwork aspects most challenging

Having established which aspects of mapwork pupils perceived to be most challenging to learn, they were asked to indicate the reasons for perceiving certain mapwork aspects most challenging to learn. The results of this question are assembled in Table 14.

Table 14: Reasons for perceiving certain mapwork aspects most challenging

TOPIC	REASONS	GENDER		#	%
		MALE	FEMALE		
Use of map symbols	1. Required regular practice	1	0	1	0.4
	2. No reasons	0	3	3	1.1
	3. They were too small to see	1	0	1	0.4
	4. One may mistake a symbol and get a wrong answer	0	1	1	0.4
	5. Required a good memory	0	1	1	0.4
Calculation of scale	1. Did not know how to calculate it	0	1	1	0.4
	2. Inadequate explanation from the teacher	0	1	1	0.4
	3. Required a lot of attention	2	1	3	1.1
	4. No reason	0	1	1	0.4
	5. It was confusing	0	2	2	0.7
Four figure grid reference	1. Teacher doesn't teach mapwork	1	0	1	0.4
	2. Difficult to understand clearly	0	1	1	0.4
	3. Had a lot of calculations (mathematical)	1	0	1	0.4
Calculation of Area	1. Did not understand how to calculate	2	0	2	0.7
	2. Had never learnt this topic before	1	0	1	0.4
	3. No reason	1	3	4	1.5
	4. Not done practically	1	0	1	0.4
	5. It was not well explained	1	0	1	0.4
	6. Difficult for places one had never been to	1	0	1	0.4
	7. Difficult to tell boundaries on the map	0	1	1	0.4
Showing relief features using contours	1. No reason	3	2	5	1.8
	2. Relief was different in many areas	1	0	1	0.4
	3. Topic had a lot of things to cover	0	2	2	0.7
	4. Contours pass through complex relief	0	1	1	0.4
	5. Teachers don't explain it clearly	1	1	2	0.7

	6. Very challenging to identify features by contours	1	2	3	1.1
	7. Never been taught	2	0	2	0.7
	8. Lack of consistent teachers	1	0	1	0.4
Calculation of gradient	1. No reason	2	4	6	2.1
	2. It was difficult & confusing	2	0	2	0.7
	3. Never taught properly	0	3	3	1.1
	4. Needed someone to be good in Maths	1	0	1	0.4
	5. It had tough calculations	0	1	1	0.4
	6. Don't understand it	1	1	2	0.7
	7. Points on the map are too small to see	0	1	1	0.4
	8. Calculation is difficult & complex	0	1	1	0.4
	9. Ideas were very difficult to apply	1	0	1	0.4
	10. Never been taught	3	0	3	1.1
	11. It was confusing	1	0	1	0.4
Six figure grid reference	1. How to find six figures when the map has four	4	2	6	2.1
	2. It involved a lot of things & I'm forgetful	0	1	1	0.4
	3. No reason	6	6	12	4.4
	4. Did not understand it	1	4	5	1.8
	5. Confuse it with four figure grid reference	0	1	1	0.4
	6. It confused may pupils	0	1	1	0.4
	7. Required very precise readings	3	2	5	1.8
	8. Involved calculations (i.e.mathematical)	1	0	1	0.4
	9. It was complicated	0	1	1	0.4
Calculating distance on a straight line	1. No reason	2	1	3	1.1
	2. We have never learnt	1	1	2	0.7
	3. Required precise measurements	2	0	2	0.7
Showing the relationships between human activities & the physical environment	1. It's very complicated	2	0	2	0.7
	2. It has a lot of things to refer to	0	1	1	0.4
	3. Have to think a lot	0	1	1	0.4
	4. Difficult to learn since seeing is believing	0	1	1	0.4
	5. No reason	4	1	5	1.8
	6. Fail to analyse/establish relationships	2	2	4	1.5
	7. Don't know how to analyse relationships	0	1	1	0.4
	8. Can't work it out without teachers' help	1	2	3	1.1
Calculating distance on a curved line	1. It's difficult to use a string	2	1	3	1.1
	2. No reason	5	14	19	6.9
	3. Teacher skips it most of the time	1	0	1	0.4
	4. It's complicated	1	2	3	1.1
	5. Never been taught	2	3	5	1.8
	6. It's involving	3	0	3	1.1
Compass bearing	1. It involves a lot	0	3	3	1.1
	2. No reason	2	7	9	3.3
	3. Never been taught about it before	0	6	6	2.1

	4. Difficult to use a compass	1	1	2	0.7
	5. Don't understand it	2	1	3	1.1
	6. Involves difficult Maths	0	3	3	1.1
Compass direction	1. No reason	3	0	3	1.1
	2. Teacher doesn't make me understand	0	2	2	0.7
	3. Don't have a compass at my school	1	0	1	0.4
	4. Never been taught before	2	0	2	0.7
Drawing a cross-section (profile)	1. No reason	4	4	8	2.9
	2. Never been taught before	3	3	6	2.1
	3. It's quite tricky	0	2	2	0.7
	4. Requires more attention to understand it	0	2	2	0.7
	5. Difficult in terms of drawing	0	1	1	0.4
Other	Nil	-	-	-	-
None	1. No reason	11	21	32	11.7
	2. Never been taught before	9	11	20	7.3
	3. Not difficult if properly taught	3	2	5	1.8
	4. The topics are related	0	1	1	0.4
	5. Learnt mapwork in Grade 9	0	1	1	0.4
	6. Easy if teachers teach	2	0	2	0.7
	TOTAL	119	155	274	100

The main value of Table 14 was its generation of a package of reasons explaining why pupils found certain mapwork aspects to be most challenging. Many studies have previously not generated such an assemblage of reasons, and geography teachers as well as school managers need to take stock of these reasons for their own curriculum planning. Readers need to appreciate this point. This point also applies to Tables 16, 41 and 42. Having said this, as shown in Table 14, the highest percentage of reasons for perceiving certain mapwork aspects most challenging was as follows, for each of the mapwork aspects: Use of map symbols (no reason, 1.1 per cent); Calculation of scale (requires lots of attention, 1.1 per cent); Four figure grid reference (teachers did not teach, 0.4 per cent); Calculation of Area (no reason, 1.5 per cent); Showing relief features using contours (it was challenging, 1.1 per cent); Calculation of gradient (no reason, 2.1 per cent) ; Six figure grid reference (no reason, 4.4 per cent) ; Calculating distance on a

straight line (no reason, 1.1 per cent); Showing the relationships between human activities and the physical environment (no reason, 1.8 per cent); Calculating distance on a curved line (no reason, 6.9 per cent); Compass bearing (no reason, 3.3 per cent); Compass direction (no reason, 1.1 per cent); Drawing a cross-section (profile) (no reason, 2.9 per cent) and ; None (no reason, 11.7 per cent).

5.2.15 The easiest mapwork aspects to learn

Having established which aspects of mapwork pupils perceived to be most challenging to learn, the pupils were also asked to indicate the easiest mapwork aspects to learn. The idea was to collaborate the earlier question in 13 for purposes of monitoring pupil consistence. The results of this question are presented in Table 15.

Table 15: The easiest mapwork aspects to learn

NO	MAPWORK ASPECT	GENDER		NUMBER OF RESPONSES	%
		Male	Female		
1.	Use of map symbols	33	31	64	23.3
2.	Calculation of scale	4	0	4	1.5
3.	Four figure grid reference	26	34	60	21.9
4.	Calculation of area	0	1	1	0.4
5.	Showing relief features using contours	2	3	5	1.8
6.	Calculation of gradient	1	1	2	0.7
7.	Six figure grid reference	8	8	16	5.8
8.	Calculating distance on a straight line	14	9	23	8.4
9.	Showing relationship between physical environment & human activities	3	10	13	4.8
10.	Calculating distance on a curved line	1	0	1	0.4
11.	Compass bearing	7	14	21	7.7
12.	Compass direction	5	10	15	5.5
13.	Drawing a cross-section(profile)	2	0	2	0.7
14.	Other	0	0	0	0
15.	None	13	34	47	17.2
	TOTAL	119	155	274	100.1

In Table 15, the highest percentage (23.3 per cent) of pupils indicated that the easiest mapwork aspect was use of map symbols. The middle percentage (4.8 per cent) indicated that showing the relationship between physical environment and human activities was the easiest, while the lowest percentage (0.4 per cent) indicated that calculating distance on a curved line was the easiest.

5.2.16 Reasons for perceiving certain mapwork aspects easiest to learn

Having established which aspects of mapwork pupils perceived easiest to learn in table 15, they were also asked to indicate the reasons for perceiving such mapwork aspects easiest to learn. The results of this question are assembled in Table 16.

Table 16: Reasons for perceiving certain mapwork aspects easiest to learn.

TOPIC	REASONS	GENDER		#	%
		MALE	FEMALE		
Use of map symbols	1. Have learnt it from primary school	1	1	2	0.7
	2. Easy to understand & is straightforward	6	2	8	2.9
	3. There is a key to guide in identifying symbols	8	8	16	5.8
	4. It involves reasoning	1	6	7	2.6
	5. Known without being taught	1	0	1	0.4
	6. No reason	3	4	7	2.6
	7. It's taught regularly	1	3	4	1.5
	8. Involves practical work	1	1	2	0.7
	9. Just need to know the symbols & what they mean	8	6	14	5.1
	10. Learnt it in grade 9	1	1	2	0.7
	11. Very educative & interesting	1	0	1	0.4
Calculation of scale	1. Its easy to understand	1	0	1	0.4
	2. learnt it in grade 9	1	0	1	0.4
	3. Involves maths & physics concepts on distance	1	0	1	0.4
	4. No reason	1	0	1	0.4
Four figure grid reference	1. It's easy to understand	4	7	11	4.0
	2. No reason	5	4	9	3.3
	3. Easy to locate areas asked for	1	3	4	1.5
	4. Learnt it in grade 9	4	6	10	3.6
	5. just need to use the numbers of the grid squares	8	8	16	5.8
	6. One doesn't need to think so hard	1	0	1	0.4
	7. Involves only four figures	3	1	4	1.5
	8. eastings & northings are given	2	6	8	2.9
	9. Teacher explained well	0	1	1	0.4
	10. Easy if one dealt with graphs	1	0	1	0.4

Calculation of Area	1. Easier if one knows maths	0	1	1	0.4
Showing relief features using contours	1. Just requires interpretation/reasoning	1	0	1	0.4
	2. Contours are easy to see on maps	1	0	1	0.4
	3. Easy to understand	0	2	2	0.7
Calculation of gradient	1. No reason	0	1	1	0.4
	2. No complicated instruments needed	1	0	1	0.4
Six figure grid reference	1. Materials are found in school	1	0	1	0.4
	2. No reason	0	3	3	1.1
	3. Easy to calculate & understand	1	4	5	1.8
	4. Familiar with it & its interesting	0	1	1	0.4
	5. Learnt it in grade 9	1	0	1	0.4
	6. Just need to use eastings & northings	3	3	6	2.1
Calculating distance on a straight line	1. No reason	4	1	5	1.8
	2. We have been taught in maths	1	0	1	0.4
	3. Measures distance between two points	2	1	3	1.1
	4. Just requires a ruler/string	3	3	6	2.1
	5. Simple & straightforward	1	2	3	1.1
	6. Scale is given to estimate units	1	1	2	0.7
	7. Doesn't involve much thinking	1	1	2	0.7
Showing the relationships between human activities & the physical environment	1. Because its common knowledge	0	1	1	0.4
	2. Requires understanding & reasoning	0	3	3	1.1
	3. They are real life experiences	2	4	6	2.1
	4. Involves applying & relating issues	0	1	1	0.4
	5. No reason	1	0	1	0.4
Calculating distance on a curved line	1. It only needs a string & a ruler	1	0	1	0.4
Compass bearing	1. learnt about this topic in maths	3	3	6	2.1
	2. No reason	1	0	1	0.4
	3. It's well explained by teachers	0	1	1	0.4
	4. It's interesting	0	1	1	0.4
	5. Easy to understand	0	2	2	0.7
	6. Learnt it in grade 9	0	1	1	0.4
	7. Just requires use of a protractor	1	5	6	2.1
Compass direction	1. Just need to know compass points	1	4	5	1.8
	2. No reason	2	0	2	0.7
	3. Doesn't require a lot of thinking	1	0	1	0.4

	4. Easy to understand	2	2	4	1.5
	5. Taught since primary school	1	2	3	1.1
Drawing a cross-section (profile)	1. No reason	2	0	2	0.7
Other	Nil	-	-	-	-
None	1. No reason	11	29	40	14.6
	2. Have never been taught	2	3	5	1.8
	3. All topics just need concentration	1	1	1	0.4
	TOTAL	119	155	274	99.9

In Table 16, the highest percentage of reasons for perceiving certain mapwork aspects easiest were as follows for each of the mapwork aspects: Use of map symbols (no reason, 2.6 per cent); Calculation of scale (it was easy to understand, 0.4 per cent); Four figure grid reference (no reason, 3.3 per cent); Calculation of Area (it was easier if one knew Mathematics, 0.4 per cent); Showing relief features using contours (it was easy to understand, 0.7 per cent); Calculation of gradient (no reason, 0.4 per cent) ; Six figure grid reference (no reason, 0.7 per cent) ; Calculating distance on a straight line (no reason, 1.8 per cent); Showing the relationships between human activities and the physical environment (required understanding and no reason, 1.8 per cent); Calculating distance on a curved line (it only needed a string and a ruler, 0.4 per cent); Compass bearing (learnt about this aspect in Mathematics, 0.7 per cent); Compass direction (just need to use compass points, 0.7 per cent); Drawing a cross-section (profile) (no reason, 0.7 per cent); Other (nil) and; None (no reason, 13.9 per cent).

5.2.17 Why pupils performed poorly in mapwork section of the final exam?

What prompted this study was the concern over High school pupils' dismal performance in school certificate mapwork. In this regard, pupil respondents were asked to give their

own views on why they thought pupils performed poorly in the mapwork section of the final exam. The results of this question are presented in Table 17.

Table 17: Why pupils performed poorly in mapwork section of the final exam?

NO	REASONS FOR POOR PERFORMANCE IN MAPWORK	GENDER		#	%
		MALE	FEMALE		
1.	Teachers barely taught	10	16	26	9.5
2.	No reason	6	5	11	4.0
3.	Least priority accorded to mapwork by pupils in the exam	4	1	5	1.8
4.	Little/no practice	8	9	17	6.2
5.	Time given was not enough for critical thinking	6	20	26	9.5
6.	Pupils not taught/exposed to mapwork	29	34	63	23.0
7.	Difficulties understanding mapwork	4	9	13	4.7
8.	Not all mapwork topics were covered	3	2	5	1.8
9.	Failure to understand exam instructions	8	3	11	4.0
10.	Casual approach to mapwork by teachers	14	19	33	12.0
11.	Laziness by pupils	10	17	27	9.9
12.	Mapwork was confusing	1	10	11	4.0
13.	Too many involving calculations	4	4	8	2.9
14.	Tendency to examine on foreign based maps	4	1	5	1.8
15.	Shortage of trained geography teachers	2	0	2	0.7
16.	Poor methodology in mapwork	6	5	11	4.0
	TOTAL	119	155	274	99.8

In Table 17 above, the highest percentage (23.0 per cent) of pupils indicated that pupils performed poorly in mapwork section of the final exam because they were not taught or exposed to mapwork. The middle percentage (4.0 per cent) indicated that pupils failed to understand examination instructions, while the lowest percentage (0.7 per cent) indicated that it was due to shortage of trained geography teachers.

5.2.18 Pupils' perception of mapwork

It was felt that the perception which pupils had of mapwork needed to be explored in this study. This is partly because pupils' overall behaviour in mapwork is significantly dependant on their perception of mapwork. In this regard, the following table describes in graphic form how pupils of this study perceived mapwork.

Table 18: Pupils' perception of mapwork

RESPONSES	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
CONFUSING	23	53	76	27.7
BORING	5	6	11	4.0
INTERESTING	28	36	64	23.4
EDUCATIVE	62	58	120	43.8
OTHER	1	2	3	1.1
TOTAL	119	155	274	100

In Table 18, the highest percentage (43.8 per cent) of pupils perceived mapwork as educative. The middle percentage (23.4 per cent) perceived mapwork as interesting while the lowest percentage (1.1 per cent) perceived mapwork as challenging.

5.2.19 Suggestions on the usefulness of mapwork after school

Pupil respondents were also asked to indicate how they thought mapwork would be of use to them after leaving school. This was meant to generate factors that influenced High school pupils' attitudes towards mapwork. The results of the question are manifested in Table 19.

Table 19: Suggestions on the usefulness of mapwork after school

NO	SUGGESTIONS ON USEFUL NESS OF MAPWORK BE AFTER SCHOOL	GENDER		#	%
		MALE	FEMALE		
1.	Locating places and features	19	36	55	20.1
2.	No suggestions	33	32	65	23.7
3.	For tourists/tourism purposes	10	16	26	9.5
4.	Gave knowledge of places	10	5	15	5.5
5.	Estimating distance	2	1	3	1.1
6.	Appreciating symbols	2	0	2	0.7
7.	Career development	5	26	31	11.3
8.	Map reading clubs	1	2	3	1.1
9.	Research purposes	7	5	12	4.4
10.	Appreciating use of compass	2	0	2	0.7
11.	Making decisions where to settle	3	2	5	1.8
12.	Finding direction	5	12	17	6.2
13.	Making strategic business decisions	2	1	3	1.1
14.	Adventure tours	2	2	4	1.5
15.	Appreciating atlases	2	2	4	1.5
16.	Military service	6	2	8	2.9
17.	Further geographical studies	8	11	19	6.9
	TOTAL	119	155	274	100

In Table 19, the highest percentage (23.7 per cent) of pupils indicated that they had no suggestions on how mapwork would be useful after school. The middle percentage (2.9 per cent) indicated that mapwork would be useful in military service while the lowest percentage (0.7 per cent) indicated that mapwork would be useful in appreciating use of a campus.

5.2.20 Would geography be enjoyable without mapwork component?

Pupil respondents were also asked to state whether they would enjoy geography if the mapwork component was removed from the syllabus. This was also meant to generate factors that influenced High school pupils' attitudes towards mapwork. The results are of the question are manifested in Table 20.

Table 20: Would geography be enjoyable without mapwork component?

RESPONSES	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
YES	35	54	89	32.5
NO	84	101	185	67.5
TOTAL	119	155	274	100

Table 20 shows that the higher percentage (67.5 percent) of pupils indicated that they would not enjoy geography without a mapwork component in the syllabus, while the lower percentage (32.5 per cent) indicated that they would not enjoy geography without a mapwork component.

5.2.21 Why geography would be enjoyable without mapwork component

Having established whether they would enjoy geography even if the mapwork component were removed from the syllabus, pupil respondents were asked to give reasons for and against their responses in Table 20. This was also meant to generate factors that influenced High school pupils' attitudes towards mapwork. The reasons for pupils' indication that they would enjoy geography if the mapwork component were removed from the syllabus of the question are presented in Table 21.

Table 21: Why geography would be enjoyable without mapwork component?

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	Geography would be less challenging	5	4	9	9.6
2.	No reason	11	8	19	20.2
3.	Teachers did not teach mapwork	4	2	6	6.4
4.	Syllabus for geography was too long	1	0	1	1.1
5.	Mapwork was Confusing (during exams)	3	14	17	18.1
6.	Took a lot of Time/time consuming	6	5	11	11.7
7.	Geography would be more interesting/exciting	3	6	9	9.6
8.	Mapwork had no application in my daily life	0	2	2	2.1
9.	Mapwork was difficult	4	12	16	17.0
10.	Reduces pupils' chances of passing	1	3	4	4.3
	TOTAL	38	56	94	100.1

In Table 21, there is a surprising higher percentage (20.2 per cent) of pupils who gave no reasons as to why they would enjoy geography without a mapwork component. Among the actual reasons given, however, the highest percentage of pupils (18.1 per cent) indicated that mapwork was too confusing. The middle percentage (9.6 per cent) indicated that geography would be more interesting and exciting, while the lowest percentage (1.1 per cent) indicated that the geography syllabus was too long.

5.2.22 Why geography would not be enjoyable without mapwork component?

Pupil respondents who indicated that they would not enjoy geography if the mapwork component was removed from the syllabus were asked to give reasons against their responses in Table 20. This was also meant to generate factors that influenced High school pupils' attitudes towards mapwork. The reasons for pupils' indication that they would not enjoy geography if the mapwork component was removed from the syllabus are presented in Table 22.

Table 22: Why geography would not be enjoyable without mapwork component

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	Gave Knowledge of Location	4	7	11	6.1
2.	No Reason	5	11	16	8.9
3.	Gave Knowledge of Features	7	7	14	7.8
4.	Helped in future Career Development	4	2	6	3.3
5.	Gave Knowledge of Places	9	8	17	9.4
6.	Helps answer some research questions	1	1	2	1.1
7.	It was Educative	4	12	16	8.9
8.	Gave Clear Picture of Issues (phenomena)	1	3	4	2.2
9.	Helped in locating places	8	5	13	7.2
10.	Mapwork was easier	6	11	17	9.4
11.	Enhanced Imagination & critical thinking	3	1	4	2.2
12.	Having Map Reading Skills was vital	1	5	6	3.3
13.	Geography & mapwork were inseparable	8	6	14	7.8
14.	Geography would be meaningless	4	9	13	7.2
15.	Mapwork was Interesting	3	7	10	5.6
16.	It was a practical component	5	2	7	3.9
17.	Enhances chances of passing	4	4	8	4.4
18.	Helped in finding direction	1	1	2	1.1
	TOTAL	78	102	180	99.8

In Table 22, the highest percentage (9.4 per cent) of pupils indicated that mapwork gave them knowledge of places and Mapwork was easier respectively. The middle percentage (7.2 per cent) indicated that geography would be meaningless, while the lowest percentage (1.1 per cent) indicated that mapwork helped them find direction.

5.2.23 Availability of geography clubs in schools

In order to generate data on whether pupils had a forum for interaction in geographical matters outside the normal class periods, pupil respondents were asked to state whether their various High schools had Geography clubs. The data generated is as shown in table 23.

Table 23: Availability of geography clubs in schools

RESPONSES	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
YES	0	0	0	0
NO	119	155	274	100
TOTAL	119	155	274	100

Table 23 shows that the higher percentage (100 per cent) of pupils in the study indicated that their schools had no geography clubs.

5.2.24 Adequacy of time to deal with mapwork questions in the exam

One of the questions pupil respondents were asked to respond to was whether there was enough time to deal with mapwork questions in the exam. The rationale was to generate data on factors influencing High school pupils' attitudes towards mapwork. Table 24 reflects the results generated.

Table 24: Adequacy of time to deal with mapwork questions in the exam

RESPONSE	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
YES	28	35	63	23.0
NO	91	120	211	77.0
TOTAL	119	155	274	100

In Table 24, the higher percentage (77.0 per cent) of pupils indicated that there was inadequate time to deal with mapwork questions in the exam, while the lower percentage (23.0 per cent) indicated that there was adequate time to deal with mapwork questions in the exam.

5.2.25 Separate examination of grade 12 mapwork questions

In order to extract data on the factors influencing High school pupils' attitudes towards mapwork, the study also explored the question of whether pupil respondents would be happy if the Grade 12 mapwork questions were a separate examination paper on their own. Table 25 shows the findings in respect of the question above.

Table 25: Separate examination of Grade 12 mapwork questions paper

RESPONSE	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
YES	92	114	206	75.2
NO	27	41	68	24.8
TOTAL	119	155	274	100

In Table 25, the higher percentage (75.2 per cent) of pupils indicated that they were in favour of a separate examination of Grade 12 mapwork questions, while the lower percentage (24.8 per cent) indicated that they were against the separate examination of grade 12 mapwork questions.

5.2.26 Reasons for separate examination of grade 12 mapwork questions

Having established whether pupil respondents would be happy if the Grade 12 mapwork questions were a separate examination paper on their own, pupils were asked to indicate the reasons for and against the separate examination for Grade 12 mapwork questions. The reasons in favour of the separate examination of Grade 12 mapwork questions are presented in the Table 26.

Table 26: Reasons for separate examination of Grade 12 mapwork questions

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	Would have enough time	36	52	88	41.7
2.	No Reason	13	7	20	9.5
3.	Mapwork required plenty of time	14	14	28	13.3
4.	One could concentrate on mapwork	19	24	43	20.4
5.	Would be easier	7	4	11	5.2
6.	Would be less confusing	3	4	7	3.3
7.	Would enhance one's chances of passing	3	7	10	4.7
8.	Would be more educative	3	1	4	1.9
	TOTAL	98	113	211	100

In Table 26, the highest percentage (41.7 per cent) of pupils indicated that there would be enough time if there was a separate examination of Grade 12 mapwork questions. The middle percentage (9.5 per cent) gave no reasons, while the lowest percentage (1.9 per cent) indicated that mapwork would be more educative.

5.2.27 Reasons against the separate examination of grade 12 mapwork questions

Having established the reasons in favour of the separate examination of Grade 12 mapwork questions, presented in Table 26, pupil respondents who had a contrary view (i.e. against) were also asked to indicate their reasons against the separate examination of Grade 12 mapwork questions. The reasons advanced by pupils against the separate examination of Grade 12 mapwork questions are presented in Table 27.

Table 27: Reasons against the separate examination of Grade 12 mapwork questions

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	Pupils should learn to be fast	3	2	5	7.9
2.	Number of geography papers would Increase	4	8	12	19.0
3.	Won't make any difference	0	4	4	6.3
4.	Mapwork would be more difficult	1	11	12	19.0
5.	No reason	4	4	8	12.7
6.	Would worsen failure rate of pupils	1	3	4	6.3
7.	It was ok the way it was	2	5	7	11.1
8.	Would disadvantage pupils with lazy teachers	4	2	6	9.5
9.	mapwork spiced paper 1 Geography	2	0	2	3.2
10.	Mapwork was boring	0	3	3	4.8
	TOTAL	21	42	63	99.8

In Table 27, the highest percentage (19.0 per cent) of pupils indicated that the number of geography papers would increase if there was a separate examination of Grade 12 mapwork questions. The middle percentage (9.5 per cent) indicated that it would disadvantage pupils with lazy teachers, while the lowest percentage (3.2 percent) indicated that mapwork spiced Geography Paper 1.

5.2.28 Pupils' approval of the way their geography teachers taught mapwork

In order to further extract data on the factors influencing High school pupils' attitudes toward mapwork, this study also explored the question of whether pupils liked the way their geography teachers taught mapwork. The findings are manifested in Table 28.

Table 28: Pupils' approval of the way their Geography teachers taught mapwork

RESPONSES	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
YES	50	70	120	43.8
NO	56	60	116	42.3
NEITHER YES/NO	13	25	38	13.9
TOTAL	119	155	274	100

In Table 28, the highest percentage (43.8 per cent) of pupils indicated that they liked (approved) the way their geography teachers taught mapwork. The middle percentage (42.3 per cent) indicated that they did not like (disapproved) the way their geography teachers taught mapwork, while the lowest percentage (13.9 per cent) indicated that they neither approved nor disapproved the way their geography teachers taught mapwork.

5.2.29 Reasons for approval of the way geography teachers taught mapwork

Having explored the question of whether pupils liked (approved) the way their geography teachers taught mapwork, pupils were asked to further state the reasons for approving and disapproving the way their geography teachers taught mapwork. The reasons advanced by pupils for approving (liking) the way their geography teachers taught mapwork are manifested in the Table 29.

Table 29: Reasons for approval of the way Geography teachers taught mapwork

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	Taught with enthusiasm	2	10	12	9.8
2.	Explained using teaching resources	2	2	4	3.3
3.	Ensured everybody understands	15	24	39	32.0
4.	Illustrated with examples	4	7	11	9.0
5.	Teacher explained concepts very well	17	20	37	30.3
6.	Teacher was interesting & confident	0	2	2	1.6
7.	Hinted on how to approach mapwork	7	1	8	6.6
8.	Teacher was patient & encouraging	1	4	5	4.1
9.	No reason	3	1	4	3.3
	TOTAL	51	71	122	100

In Table 29, the highest percentage (32.0 per cent) of pupils indicated that their geography teacher ensured that everybody understood. The middle percentage (6.6 per cent) indicated that their geography teacher hinted on how to approach mapwork, while the lowest percentage (1.6 per cent) indicated that their geography teacher was interesting and confident.

5.2.30 Reasons for disapproval of the way geography teachers taught mapwork

Having explored pupils' reasons for approving the way their geography teachers taught mapwork, pupil respondents, with a contrary view, were also asked to state the reasons for disapproving the way their geography teachers taught mapwork. The reasons advanced by pupils for not liking (disapproving) the way their geography teachers taught mapwork are presented in Table 30.

Table 30: Reasons for disapproval of the way Geography teachers taught mapwork

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	No reason	3	3	6	5.2
2.	Never been taught	19	24	43	37.4
3.	Teacher was boring	9	6	15	13.0
4.	Barely teaches mapwork	12	9	21	18.3
5.	Too theoretical/abstract	2	2	4	3.5
6.	Teacher did not explain well	10	10	20	17.4
7.	Teacher was not serious	4	2	6	5.2
	TOTAL	59	56	115	100

In Table 30, the highest percentage (37.4 per cent) of pupils indicated that they had never been taught mapwork by their geography teacher. The middle percentage (13.0 per cent) indicated that their geography teacher was boring, while the lowest percentage (3.5 per cent) indicated that their geography teacher was too theoretical or abstract.

5.2.31 Reasons for not approving /disapproving of the way mapwork was taught

Some pupils who neither approved nor disapproved the way their geography teachers taught mapwork also stated their reasons for their stance. The reasons advanced by pupils for not approving/disapproving the way their geography teachers taught mapwork are presented in Table 31.

Table 31: Reasons for not approving /disapproving of the way mapwork was taught

NO	REASONS	GENDER		#	%
		MALE	FEMALE		
1.	No reason	4	11	15	40.5
2.	Never been taught	9	13	22	59.5
	TOTAL	13	24	37	100

Table 31 shows that the higher percentage (59.5 per cent) of pupils indicated that they had never been taught mapwork by their geography teacher, while the lower percentage (40.5 per cent) gave no reasons for neither approving nor disapproving their geography teacher's way of teaching mapwork.

5.2.32 The number of geography periods per week

In order to further extract data on the factors influencing High school pupils' attitudes towards mapwork, this study also explored the question of the number of geography periods per week that pupils were allocated. The findings are manifested in Table 32.

Table 32: Number of geography periods per week

NO OF PERIODS	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
3	37	53	90	34.8
4	80	100	180	65.7
5	2	2	4	1.5
TOTAL	119	155	274	100

In Table 32, the highest percentage (65.7 per cent) of pupils indicated that they had four geography periods per week. The middle percentage (34.8 per cent) indicated that they had three geography periods per week, while the lowest percentage (1.5 per cent) indicated that they had five geography periods per week.

5.2.33 Teaching of mapwork outside the classroom

In order to extract data on the methodology of mapwork in schools, pupil respondents were asked to state whether they had ever been taught mapwork outside the classroom.

This was crucial to establish whether methodology was a factor in High school pupils' attitudes towards mapwork. The findings are presented in Table 33.

Table 33: Teaching of mapwork outside the classroom to pupils

RESPONSES	GENDER		NUMBER OF RESPONSES	%
	Male	Female		
YES	29	41	70	25.5
NO	90	114	204	74.5
TOTAL	119	155	274	100

Table 33 shows that the higher percentage (74.5 per cent) of pupils indicated that they had never been taught mapwork outside the classroom, while the lower percentage (25.5 per cent) indicated that they had been taught mapwork outside the classroom.

5.2.34 Suggestions on how performance could be improved in mapwork

Having sought the various views, opinions and experiences of pupil respondents on mapwork, the study finally asked pupil respondents to suggest how performance in mapwork could be improved. This was vital to get the perspectives of pupils regarding how they felt mapwork performance could be improved. Their suggestions would be taken into account in the recommendations. The suggestions of pupils are manifested in Table 34.

Table 34: Suggestions on how performance could be improved in mapwork

NO	SUGGESTIONS FROM PUPILS	GENDER		#	%
		MALE	FEMALE		
1.	More practice was needed	19	23	42	15.3
2.	No suggestion	25	19	44	16.1
3.	Teachers to spend more time on mapwork	7	2	9	3.3
4.	Be taught from grade10-12	9	11	20	7.3
5.	Teachers to put more effort in mapwork	3	2	5	1.8
6.	Separate mapwork from P1	9	10	19	6.9
7.	Re-introduce geography clubs	8	8	16	5.8
8.	Taking pupils out for mapwork tours	3	13	16	5.8
9.	Teachers to take mapwork seriously	6	15	21	7.7
10.	Provide mapwork books & equipment	6	12	18	6.6
11.	Base mapwork on Zambian maps	3	0	3	1.1
12.	Hinting on how to answer/approach mapwork	2	3	5	1.8
13.	Teachers to improve their methodology	4	16	20	7.3
14.	Need for more trained geography teachers	8	5	13	4.7
15.	Pupils to concentrate on mapwork	4	9	13	4.7
16.	Increase number of geography periods	2	3	5	1.8
17.	Make mapwork less confusing	0	4	4	1.5
18.	Introduce geography resource room	1	0	1	0.4
	TOTAL	119	155	274	99.9

In Table 34, there was a surprising higher percentage (16.1 per cent) of pupils who gave no suggestions as to how performance could be improved in mapwork. Among the actual suggestions given, however, the highest percentage of pupils (15.3 per cent) suggested that more practice was needed in mapwork. The middle percentage (4.7 per cent) suggested that there was need for employing more trained geography teachers, while the lowest percentage (0.4 percent) suggested that there was need to introduce geography resource rooms.

The next part of this chapter will present findings of this study from the teachers' perspective.

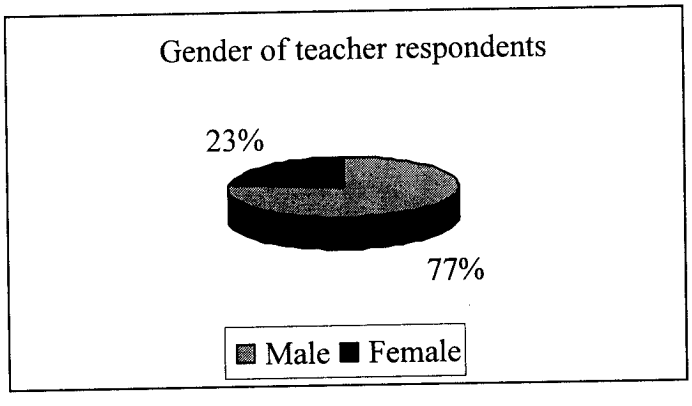
5.3 PART B - TEACHERS' PERSPECTIVES ON MAPWORK

As indicated at the beginning of this chapter that the findings of this study would be presented in two parts, namely, Part A (Pupils' perspectives on mapwork) and Part B, (Teachers' perspectives on various aspects of mapwork), this part of the chapter will now present views, opinions and experiences of geography teachers vis-à-vis mapwork. The presentation will first start with the biographical data of the teachers.

5.3.1 Gender of teacher respondents

In order to give readers an idea of the profile of teacher respondents in this study, in terms of gender, teachers were also asked to state their gender (i.e. whether male or female) in the questionnaire. Figure 17 shows the profile of teachers in terms of gender.

Figure 17: Gender of teacher respondents.



In Figure 17, the higher percentage (77.0 per cent) of teachers were female, while the lower percentage of teachers (23.0 per cent) were male.

5.3.2 Teacher respondents by age

In order to give the reader an insight into the age profile of teacher respondents in the study, teachers, like pupils were also asked to state their age in the questionnaire. The profile of teachers in terms of age is manifested in Table 35.

Table 35: Teacher respondents by age

AGE GROUP	MALES	FEMALES	NUMBER	%
20—24 YEARS	0	1	1	4.5
25—29 YEARS	2	0	2	9.1
30—34 YEARS	1	0	1	4.5
35—39 YEARS	6	3	9	40.1
40—44 YEARS	2	1	3	13.6
45—49 YEARS	2	0	2	9.1
50—54 YEARS	4	0	4	18.2
TOTAL	17	5	22	99.1

In Table 35, the highest percentage (40.1 per cent) of teachers' age group was between 35-39 years. The middle percentage (9.1 per cent) was between 25-29 years, while the lowest percentage (4.5 per cent) was between 30-34 years.

5.3.3 Qualifications of teachers

The question of teachers' qualifications was explored in the teachers' questionnaire with a view to giving the reader further insight into the profile of teacher respondents in the study. The profile of teachers in terms of qualifications is manifested in Table 36.

Table 36: Qualifications of teachers

QUALIFICATIONS OF TEACHERS	MALES	FEMALES	NUMBER	%
CERTIFICATE	1	0	1	4.5
SECONDARY DIPLOMA	12	5	17	77.3
B.A EDUCATION	3	0	3	13.6
MASTERS	1	0	1	4.5
TOTAL	17	5	22	99.9

Table 36 shows that the highest percentage (77.3 per cent) of teachers were holders of Secondary Diplomas. The middle percentage (13.6 per cent) of teachers were Degree holders, while the lowest percentage (4.5 per cent each) were Masters Degree and certificate holders respectively.

5.3.4 Distribution of High schools and teachers sampled by district

Teacher respondents were also asked to indicate the names of their schools instead of their names to maintain confidentiality. Additionally, names of schools were also meant to give readers a profile of schools that were included in this study and the districts they hailed from on the Copperbelt province. The data generated is presented in Table 37.

Table 37: Distribution of High schools and teachers sampled by district

NO	HIGH SCHOOL SAMPLED	DISTRICT	TEACHERS SAMPLED		#	%
			MALE	FEMALE		
11	Chililabombwe High	Chililabombwe	1	1	2	9.1
12	Chikola High	Chingola	0	2	2	9.1
13	Kalulushi High	Kalulushi	1	0	1	4.5
14	Hellen Kaunda High	Kitwe	2	0	2	9.1
15	Kalumbwa High	Lufwanyama	2	1	3	13.6
16	Mpatamatu High	Luanshya	3	0	3	13.6
17	Ibenga High	Masaiti	2	0	2	9.1
18	Mpongwe High	Mpongwe	0	1	1	4.5
19	Kantanshi High	Mufulira	4	0	4	18.2
20	Kansenshi High	Ndola	2	0	2	9.1
	TOTAL		17	5	22	99.9

Table 37 illustrates that the highest percentage (18.2 per cent) of teachers came from Kantanshi High school. The middle percentage (9.1 per cent) came from Hellen Kaunda High school, while the lowest percentage (4.9 percent) came from Mpongwe High school.

5.3.5 The status of geography in the school curriculum

In order to generate and collaborate data on the status of geography in the school curriculum, teacher respondents in the study were asked to state whether their schools offered geography as a compulsory or optional subject. This is a question that was put forward to pupils too. The idea was to ensure consistence from respondents. The results of this question are presented in Table 38.

Table 38: The status of geography in the school curriculum

RESPONSES	GENDER		NUMBER	%
	Male	Female		
OPTIONAL	15	4	19	86.4
COMPULSORY	2	1	3	13.6
TOTAL	17	5	22	100

Table 38 shows that the higher percentage of teachers (86.4 per cent) indicated that geography was optional, while the lowest percentage of teachers (23.0 per cent) indicated that geography was compulsory in their schools.

5.3.6 Teaching experience of geography teachers

In order to give readers an insight into the teaching experience in mapwork of teacher respondents in the study, teachers were asked to indicate their teaching experience in the questionnaire. Findings regarding the teaching experience of respondents are manifested in Table 39.

Table 39: Teaching experience of geography teachers

TEACHING EXPERIENCE	GENDER		NUMBER	%
	Male	Female		
LESS THAN 5 YEARS	1	1	2	9.1
5—10 YEARS	7	1	8	36.4
ABOVE 10 YEARS	3	9	12	54.5
TOTAL	11	11	22	100

Table 39 illustrates that the highest percentage (54.5 per cent) of teachers indicated that they had above 10 years teaching experience in mapwork. The middle percentage (36.4

per cent) of teachers indicated that they had 5-10 years teaching experience in mapwork, while the lowest percentage (9.1 per cent) of teachers indicated that they had less than 5 years teaching experience in mapwork.

5.3.7 Aspects of mapwork perceived very challenging to teach

There was a question in the teachers' questionnaire asking teacher respondents to indicate aspects of mapwork they perceived very challenging. This was to prepare ground for the question in Table 41. The responses to aspects of mapwork teachers perceived very challenging to teach are presented in Table 40.

Table 40: Aspects of mapwork perceived very challenging to teach

NO	MAPWORK AREA/TOPIC	GENDER		NUMBER OF RESPONSES	%
		Male	Female		
1.	Use of map symbols	1	0	1	1.5
2.	Calculation of scale	5	2	7	10.3
3.	Four figure grid reference	1	1	2	2.9
4.	Calculation of area	3	1	4	5.9
5.	Showing relief features using contours	7	3	10	14.7
6.	Calculation of gradient	7	3	10	14.7
7.	Six figure grid reference	1	0	1	1.5
8.	Calculating distance on a straight line	1	1	2	2.9
9.	Showing relationship between physical environment & human activities	3	1	4	5.9
10.	Calculating distance on a curved line	3	1	4	5.9
11.	Compass bearing	2	2	4	5.9
12.	Compass direction	0	1	1	1.5
13.	Drawing a cross-section(profile)	12	2	14	20.6
14.	Other	1	0	1	1.5
15.	None	1	2	3	4.4
	TOTAL	48	20	68	100.1

Table 40 shows that the highest percentage of teachers (20.6 per cent) indicated that they perceived drawing a cross-section (profile) very challenging to teach. The middle percentage (5.9 per cent) indicated that they perceived compass bearing very challenging to teach, while the lowest percentage (1.5 per cent) indicated that they perceived other items (settlement patterns) very challenging to teach.

5.3.8 Mapwork item perceived to be the most challenging

After establishing which aspects of mapwork teachers perceived to be very challenging to teach as shown in Table 40, they were asked to indicate the mapwork item perceived to be the most challenging to teach.. The results of this question are assembled in Table 41.

Table 41: Mapwork item perceived to be the most challenging

NO	MAPWORK AREA/TOPIC	GENDER		NUMBER OF RESPONSES	%
		Male	Female		
1.	Use of map symbols	0	0	0	0
2.	Calculation of scale	2	0	2	9.1
3.	Four figure grid reference	0	0	0	0
4.	Calculation of area	2	0	2	9.1
5.	Showing relief features using contours	2	1	3	13.6
6.	Calculation of gradient	1	1	2	9.1
7.	Six figure grid reference	0	0	0	0
8.	Calculating distance on a straight line	0	0	0	0
9.	Showing relationship between physical environment & human activities	0	0	0	0
10.	Calculating distance on a curved line	2	0	2	9.1
11.	Compass bearing	0	1	1	4.5
12.	Compass direction	0	0	0	0
13.	Drawing a cross-section(profile)	4	1	5	22.7
14.	Other	0	0	0	0
15.	None	4	1	5	22.7
	TOTAL	17	5	22	99.9

In Table 41, there is a surprising higher percentage (22.7 per cent) of teachers who indicated that they found none of the mapwork items (1-14 above) most challenging. Among the actual mapwork items given, the highest percentage of teachers (22.7 per cent) indicated that they found drawing a cross-section (profile) most challenging to teach. The middle percentage (9.1 per cent) indicated that they found calculation of area most challenging to teach, while the lowest percentage (4.5 per cent) indicated that they found compass bearing most challenging to teach.

5.3.9 Reasons for perceiving certain mapwork items most challenging

The question of establishing reasons why teacher respondents perceived certain mapwork aspects most challenging to teach was very vital to this study because it would help the reader make conclusions regarding the challenges teachers faced and how these impacted on pupils. The findings of this study, in respect of the question above, are assembled in Table 42.

Table 42: Reasons for perceiving certain mapwork items most challenging

TOPIC	REASONS	#	%
Use of map symbols	Nil	0	0
Calculation of scale	1. Pupils find it difficult to use scale	1	4.5
	2. It confuses pupils	1	4.5
Four figure grid reference	Nil	0	0
Calculation of area	1. some shapes are irregular	1	4.5
	2. takes a lot of time for pupils to understand	1	4.5
Showing relief features using contours	1. Have to spend a lot of time on it for pupils to understand	1	4.5
	2. Pupils get confused on how contours relief features	1	4.5
	3. Requires pupils who are good at visualising	1	4.5
Calculation of gradient	1. Takes a lot of time for pupils to understand	1	4.5
	2. No reason	1	4.5
Six figure grid reference	Nil	0	0
Calculating distance on a straight line	Nil	0	0
Showing the relationship between physical environment & human activities	Nil	0	0
Calculating distance on a curved line	1. Books on this topic are scarce	2	9.1
Compass bearing	1. Not trained geographer	1	4.5
Compass direction	Nil	0	0
Drawing a cross-section(profile)	1. Involves a lot of time & attention	1	4.5
	2. Ignorance about the topic	1	4.5
	3. Have not tried it	1	4.5
	4. Difficult for pupils to understand it	1	4.5
	5. Arrangement of contours is complex	1	4.5
Other	Nil	0	0
None	1. No reason	4	18.2
	2. Do not find problems	1	4.5
	3.		
TOTAL		22	94.8

Table 42 demonstrates that the highest percentages of reasons for perceiving certain mapwork aspects most challenging were as follows for each of the mapwork aspects: Calculation of scale (pupils found it difficult to use, 4.5 per cent); Calculation of Area (some shapes were irregular, 4.5 per cent); Showing relief features using contours (one had to spend a lot of time on it for pupils to understand , 4.5 per cent); Calculation of gradient (took a lot of time for pupils to understand, 4.5 per cent) ; Calculating distance on a curved line (books on this aspect were scarce, 9.1 per cent); Compass bearing (not trained geographer, 4.5 per cent); Drawing a cross-section /profile (involved a lot of time and attention, 4.5 per cent) and ; None (no reason, 18.2 per cent).

5.3.10 Why pupils performed poorly in mapwork section of the final exam

As alluded to earlier on in part 5.2.17 of this chapter, what prompted this study was the concern over pupils' dismal performance in school certificate mapwork. In this regard, teacher respondents were also asked to give their own experiences on why they thought pupils performed poorly in the mapwork section of the final exam. The results of this question are reflected in Table 43.

Table 43: Why pupils performed poorly in mapwork section of the final exam

NO	REASONS	#	%
1.	Lack of practice	8	36.4
2.	Lack of mapping reading techniques	1	4.5
3.	Teachers themselves are poorly trained	2	9.1
4.	Maps confuse pupils	1	4.5
5.	Lack of teaching materials	3	13.6
6.	Not taught at senior level	2	9.1
7.	Inadequate time devoted to mapwork	5	22.7
	TOTAL	22	99.9

Table 43 indicates that the highest percentage (36.4 per cent) of teachers indicated that pupils performed poorly in the mapwork section of the final exam because they lacked practice in mapwork. The middle percentage (9.1 per cent) indicated that teachers themselves were poorly trained in mapwork, while the lowest percentage (4.5 per cent) indicated that maps confused pupils.

5.3.11 Teaching of mapwork outside the classroom

In order to further extract data on the methodology of mapwork in schools, teacher respondents were asked to state whether they had ever taught their pupils mapwork outside the classroom. As acknowledged earlier on in part 5.2.33 of this chapter, this question was vital to determine whether methodology was a factor in High school pupils' attitudes towards mapwork. The findings are manifested in Table 44.

Table 44: Teaching of mapwork outside the classroom

RESPONSE	GENDER		NUMBER	%
	Male	Female		
YES	5	0	5	22.7
NO	12	5	17	77.3
TOTAL	17	5	22	100

Table 44 shows that the highest percentage (77.3 per cent) of teachers indicated that they had never taught mapwork outside the classroom, while the lowest percentage (22.7 per cent) of teachers indicated that they had taught mapwork outside the classroom to pupils.

5.3.12 Number of times pupils were taken out for mapwork fieldwork

Having established whether teachers had taught mapwork to their pupils outside the classroom, those who affirmed that they had taken pupils out for mapwork fieldwork

were asked to indicate how many times they had done so. Table 45 presents the findings in this respect.

Table 45: Number of times pupils were taken out for mapwork fieldwork

RESPONSES	GENDER		NUMBER	%
	Male	Female		
NEVER	12	5	17	77.3
LESS THAN FIVE TIMES	5	0	5	22.7
FIVE TIMES	0	0	0	0
MORE THAN FIVE TIMES	0	0	0	0
TOTAL	17	5	22	100

Table 45 illustrates that the highest percentage of teachers (77.3 percent) indicated that they had never taken pupils out for fieldwork to teach them about aspects of mapwork while the lowest percentage (22.7 percent) indicated that they had taken pupils out for fieldwork to teach them about aspects of mapwork for less than five times.

5.3.13 Reasons for not taking pupils out for fieldwork

Teachers who indicated that they had not taken pupils out for fieldwork to teach them about aspects of mapwork were also asked to advance reasons for not doing so. This was meant to generate data on the challenges teachers faced in taking pupils out for mapwork fieldwork. The findings of this study, in this regard, are shown in Table 46.

Table 46: Reasons for not taking pupils out for mapwork fieldwork

NO	REASONS	#	%
1.	Heavy teaching load	1	5.9
2.	No reason	1	5.9
3.	Lack of funding from administration	3	17.6
4.	Lack of transport	2	11.8
5.	Still new at the school	1	5.9
6.	Inadequate geography periods	2	11.8
7.	Teaching the subject for the first time	1	5.9
8.	Never thought of it	2	11.8
9.	Inadequate/limited time	4	23.5
	TOTAL	17	100.1

Table 46 reveals that the highest percentage (23.5 per cent) of teachers indicated that they had not taken pupils out for fieldwork to teach them about aspects of mapwork because of inadequate/limited time. The middle percentage (11.8 per cent) indicated that they had never thought of it, while the lowest percentage (5.9 per cent) indicated that they were teaching geography for the first time.

5.3.14 Separate examination of Grade 12 mapwork questions

In order to further extract data on the factors influencing pupils' attitudes towards mapwork, the study also explored, from teachers, the question of whether Grade 12 mapwork questions should be a separate examination paper on their own. Table 47 shows the findings in respect of the question above.

Table 47: Separate examination of Grade 12 mapwork questions

RESPONSES	GENDER		NUMBER	%
	Male	Female		
YES	8	0	8	36.4
NO	9	5	14	63.6
TOTAL	17	5	22	100

As shown in Table 47, the highest percentage (63.5 per cent) of teachers indicated that they were against separating the examination of Grade 12 mapwork questions, while the lowest percentage (36.4 per cent) indicated that they were in favour of separate examination.

5.3.15 Reasons for separate examination of grade 12 mapwork questions

Having established from teachers whether Grade 12 mapwork questions should be a separate examination paper on their own, they were asked to indicate the reasons for and against separate examination of Grade 12 mapwork questions. Among reasons teachers advanced in favour of separate examination of Grade 12 mapwork questions are presented in Table 48.

Table 48: Reasons for separate examination of grade 12 mapwork questions

NO	REASONS	#	%
1.	To set objective & subjective questions	1	12.5
2.	Requires more time	4	50
3.	Map techniques will be explored fully	3	37.5
	TOTAL	8	100

Table 48 illustrates that the highest percentage (50.0 per cent) of teachers indicated that mapwork required more time hence, the need to have a separate examination of Grade 12 mapwork questions. The middle percentage (37.5 per cent) indicated that map techniques would be explored fully, while the lowest percentage (12.5 per cent) indicated that separating mapwork would enable the setting of both objective and subjective mapwork questions.

5.3.16 Reasons against separate examination of Grade 12 mapwork questions

Having established the reasons in favour of the separate examination of Grade 12 mapwork questions presented in Table 48, teacher respondents who had a contrary view were also asked to indicate their reasons against the separate examination of Grade 12 mapwork questions. The reasons advanced by teachers against the separate examination of Grade 12 mapwork questions are presented in Table 49.

Table 49: Reasons against separate examination of Grade 12 mapwork questions

NO	REASONS	#	%
1.	no need to separate it	6	42.9
2.	Limited mapwork areas to be examined	2	14.3
3.	Geography papers will increase	3	21.4
4.	Pupils to take mapwork seriously with their teachers	2	14.3
5.	Pupils' response to mapwork would be bad	1	7.1
	TOTAL	14	100

Table 49 demonstrates that the highest percentage (42.9 per cent) of teachers indicated that there was no need to separate the examination of Grade 12 mapwork questions. The middle percentage (14.3 per cent) indicated that there were limited mapwork areas to be examined, while the lowest percentage (7.1 per cent) indicated that pupils' response to mapwork would be bad.

5.3.17 Challenges pupils faced in mapwork

Teachers were asked to state what the challenges pupils in their schools faced when dealing with mapwork. This was meant to further generate data on the challenges pupils faced from a teachers' perspective. The findings of this study in this regard are shown in Table 50.

Table 50: Challenges pupils faced in mapwork

NO	REASONS	#	%
1.	Gradient & Drawing of cross-section	2	9.1
2.	Calculation of Area	1	4.5
3.	Little time allocated to mw	3	13.6
4.	Showing the relationship between physical environment & human activities	4	18.2
5.	Revision with pupils done near exams	1	4.5
6.	Lack of mw materials	1	4.5
7.	Teachers prepare pupils inadequately	2	9.1
8.	Showing the relief using contours & Calculation of scale	3	13.6
9.	Measuring distance	1	4.5
10.	Four & six figure grid reference	1	4.5
11.	Learning in overcrowded classrooms	1	4.5
12.	Pupils are forgetful	1	4.5
13.	Some mw books are older than pupils	1	4.5
	TOTAL	22	99.6

Table 50 highlights that the highest percentage (18.2 per cent) of teachers indicated that showing the relationships between human activities and the physical environment was a challenge pupils faced in mapwork. The middle percentage (4.5 per cent) indicated that the period for revision was done too close to examination time, while the lowest percentage (4.5 per cent) indicated that some mapwork books were older than pupils themselves.

5.3.18 Suggestions on how performance could be improved in mapwork

Having sought the various views, opinions and experiences of teacher respondents on mapwork, the study finally asked teachers (just like earlier done in part 5.2.34 with pupils) to suggest how performance in mapwork could be improved. This was vital in getting the perspectives of teachers (being the people on the grounds who were teaching

mapwork) regarding how performance in mapwork could be improved. The suggestions of teachers are presented in Table 51.

Table 51: Suggestions on how performance could be improved in mapwork

NO	SUGGESTIONS FROM TEACHERS	#	%
1.	Devote a lot of time to mw & scheme it	4	18.2
2.	Remove unnecessary physical/human geography topics	1	4.5
3.	Increase geography periods for excursions	1	4.5
4.	Enhance co-operation with maths dept.	1	4.5
5.	Provide mw materials & books	3	13.6
6.	Need a lot of practical work	5	22.7
7.	Separate mw from paper 1	1	4.5
8.	Improve mapwork methodology	2	9.1
9.	Allocate more marks to mapwork	1	4.5
10.	Be taught from grade 8-12	3	13.6
	TOTAL	22	99.7

Table 51 shows that the highest percentage (22.7 per cent) of teachers suggested the need for a lot of practical work if mapwork performance was to be improved. The middle percentage (9.1 per cent) suggested the need for improved mapwork methodology, while the lowest percentage (4.5 percent) suggested the need to allocate more marks to mapwork.

The next chapter will discuss the findings of this study.

CHAPTER SIX

DISCUSSION OF FINDINGS

6.1 Introduction

This chapter discusses the findings of this study presented in Chapter Five by focusing on three major subheadings premised on the research questions and objectives of this study, namely: the attitudes of selected High school pupils' towards mapwork on the Zambian Copperbelt; factors influencing such High school pupils' attitudes towards mapwork; and establishing the aspects of mapwork among selected High school pupils perceived most challenging and why.

6.2 The attitudes of selected High school pupils' attitudes towards mapwork

The study revealed that there were more High school pupils who liked mapwork than those who indicated that they did not like mapwork. The high percentage of pupils who liked mapwork could be attributable to the favourable ranking of geography by pupils who indicated that they liked geography, the subject under which mapwork falls. Additionally, the high percentage of pupils who liked mapwork could be attributed to the status of geography in the school curriculum where pupils indicated that geography was optional, meaning it was taken by pupils who liked it from the bottom of their hearts, instead of being imposed upon them. Among the pupils who indicated that they liked mapwork, the highest percentage indicated that mapwork gave them knowledge of places and features. The middle percentage indicated that mapwork gave them higher marks, while the lowest percentage indicated that they liked mapwork because it was educative.

The reasons given just confirm one of the factors (utility factor) shown in Figure 18 about the utility of mapwork to pupils. Utility factor is discussed further in sub-section 6.3.

The small percentage of pupils who indicated that they did not like mapwork could also be attributable to pupils who liked geography, in general, but still had reservations about certain components that made up the High school geography syllabus (e.g. mathematical geography and mapwork, in this case). This researcher also noted, while in the field, that geography was facing stiff competition from subjects such as Civic Education, Religious Education and History, all of which fell under the Social Sciences Department, and were commonly offered as optional subjects. Consequently, this meant that once a particular class or subject got the number of pupils it required for a particular optional subject, excess pupils could be asked or compelled to pick another optional subject which could not have ranked top on their desired options. As a result, some pupils could have found themselves in the geography class by fate rather than design (i.e. pushed by circumstances than by choice).

Further, among the pupils who indicated that they did not like mapwork, the major reason cited was that they had never been taught mapwork. The middle percentage indicated that mapwork was time consuming, while the lowest percentage indicated that they lacked materials. This meant that pupils were frustrated and disoriented by their geography teachers' inability to expose them to mapwork. As regards mapwork being time consuming, the implication is that pupils who really wanted to master mapwork might have done so at the expense of other components of geography and subjects in the curriculum. The lack of mapwork materials is another issue that was also echoed by

teachers of geography. In fact, teachers indicated that the few materials available in their schools (departments) were older than the pupils themselves. This means there had been very little corresponding purchase of books by government and even schools to match with 21st century trends in mapwork.

Furthermore, in order to collaborate earlier answers to ascertain the consistence of pupil respondents, pupils were asked to state how they perceived mapwork. The highest percentage indicated that it was educative. The middle percentage perceived mapwork as interesting. The lowest percentage indicated that it was challenging. In short, it was clear from this study, that the majority of the pupils had a positive perception of mapwork describing it as interesting and educative.

When further asked whether geography would be enjoyable without the mapwork component, the majority of pupils indicated that they would not enjoy geography without a mapwork component in the syllabus, while the minority indicated that they would not enjoy geography without a mapwork component. What the above discussion establishes is that geography is a popular optional subject, and that it still has a place in the hearts of many High school pupils on the Zambian Copperbelt. Furthermore, the positive orientation that most pupils had towards mapwork has pedagogical implications. Firstly, teachers of geography should take advantage of this positive scenario and create an enabling environment that would ignite pupils' performance in mapwork at school certificate level. Secondly, the popularity of geography, as an optional subject on the Zambian Copperbelt, is consistent with the findings of Weeden (2007) who found that geography was still a popular optional subject in England and Wales.

6.3 Factors that influenced High school pupils' attitudes towards mapwork

The second research question and objective of this study sought to determine what factors influenced such High school pupils to have such attitudes towards mapwork. As manifested in Figure 18, the study established that High school pupils' attitudes towards mapwork were influenced by the interplay of the following: (a) Time factor, (b) Content factor, (c) Pupil factor, (d) Teacher factor, (e) Methodology factor, (f) Utility factor and (g) Other factors (e.g. co-curricular activities, materials). Each of the factors will be briefly deconstructed within the context of the findings of this study and the factors' interplay. Hence, the inclusion of Figure 18 in the discussion section of this chapter to highlight the interplay of factors, graphically, in context of this discussion.

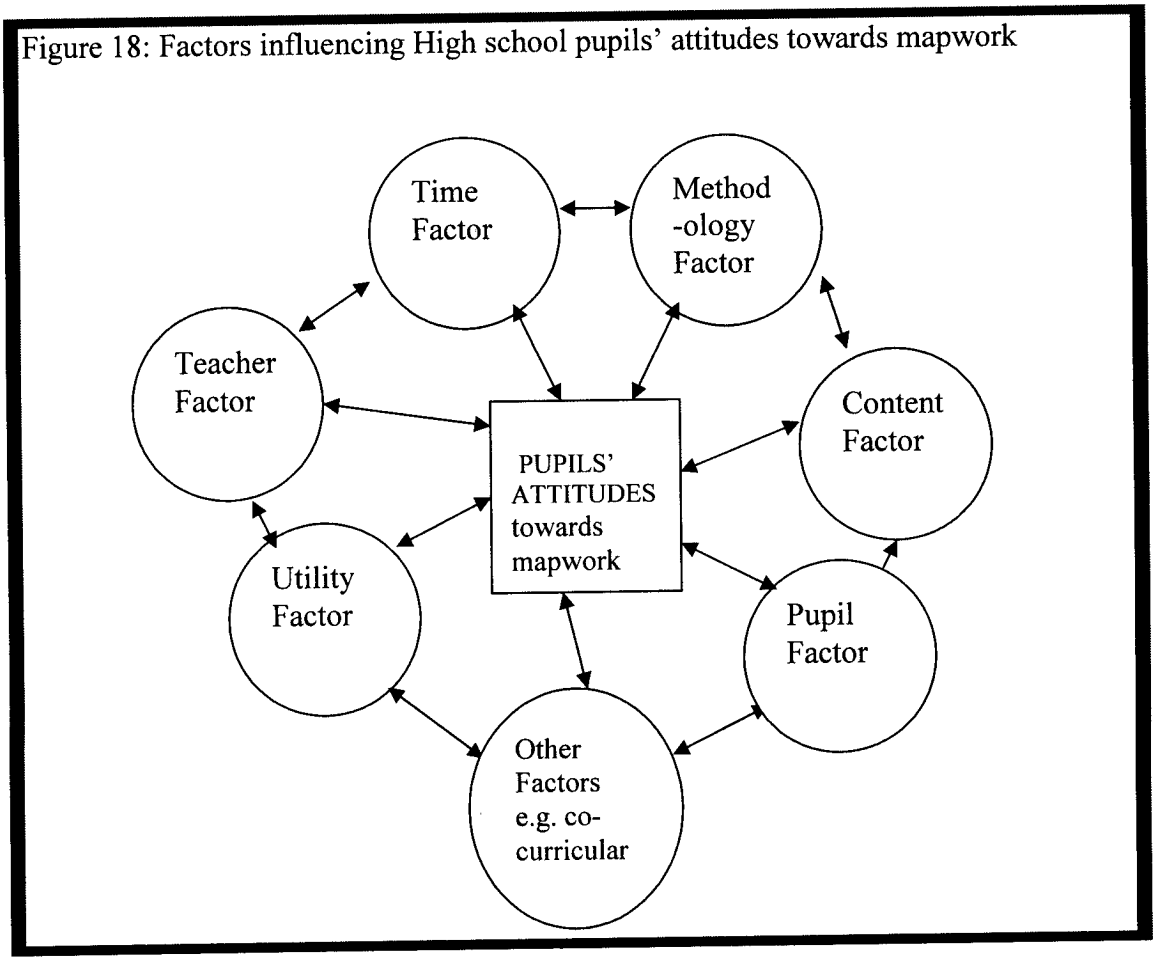
(a) Time factor

From the findings regarding time, the study showed that more respondents complained of the time factor in dealing with mapwork questions in the examination. Mapwork questions required critical thinking, and being objective questions, one had to work extra hard to eliminate distracters before arriving at the correct answer. Interestingly, time factor had been a consistent complaint among pupil and teacher respondents. The small percentage of respondents who had no complaints about time when dealing with mapwork questions could be cited as geniuses (above average pupils bearing in mind, as earlier alluded to, that geography appeared to be reserved for less able pupils not only in High schools in Zambia, but even in Nigeria as acknowledged by Okpala in 2000).

Time factor came out among the major issues that both pupils and teachers of geography in this study, complained about. It was no surprise, then, that increase in time was also among the major suggestions made by teachers and pupils on how performance in

mapwork could be improved. It was time factor, actually, that influenced most pupil and teacher respondents to indicate that Geography Paper 1 (mapwork examination component) should be examined separately to allow pupils more time to think through their answers in the examination.

Figure 18: Factors influencing High school pupils' attitudes towards mapwork



Source: Field Data (2008)

Time factor continued

The results of this study clearly showed that more pupils had four (4) periods of geography (most of which came as double periods). The issue of investigating the

number of periods was significant in that one of the issues teachers complained of was limited time. The implication is that if geography was given limited time to be taught, it meant certain components that the teacher might deem unnecessary, time consuming, or inconsequential were left out in the cold in a bid to attend to other components deemed very important. With such a scenario, it would not be surprising that teachers were alleged to be barely teaching mapwork (worse still, towards examination time). Who knows what else teachers of geography were barely teaching in the geography syllabus in Zambia, apart from mapwork? Anyway, that is food for thought for other researchers who may want to pick it up from there in future.

(b) Content factor

What was notable from this study also was that there was some similarity in the aspects of mapwork teachers of geography and pupil respondents found very challenging to teach and learn respectively. What was notable also was that most of the aspects cited very challenging were mathematical in nature. This could mean some pupils and teachers could be mathematically handicapped and might have been vulnerable when it came to manipulating these aspects. Consequently, some teachers of geography who themselves had a problem with the mathematically dosed mapwork aspects might have taught the above topics poorly or avoided them, all together, to avoid embarrassing themselves before their pupils. They would rather be cited for "contempt of mapwork" (not teaching mapwork) than teach aspects they were not comfortable with.

Commenting on the content of maps, Montello (2002) raised interesting points about the scientific nature of maps when he emphasised the empirical nature of cartography.

Songguang (2005) subscribed to Montello's (2002) definition of empiricism as an epistemology in which areas about the world were generated and verified through systematic observation and measurement. Songguang (2005) further argued that we can distinguish that maps differ from other mediums of communication on the basis of their systemic and formal nature. Thus, we can extrapolate that all maps are products of some kind of systematic thought process, and rarely acts of sudden impulse or inspiration. In other words, the implication for pedagogy, in the opinion of this researcher, is that pupils need to be properly and systematically drilled through the content of mapwork instead of hurriedly pushing mapwork ideas and skills just for examination purpose because mapwork content is highly dosed with Mathematical and Physics principles that required time and proper methodology.

The view of the challenging nature of mapwork content was also underscored by Gerber (1981) who observed that maps were quite complex to learners because each map was a coded representation of an area (This meant for one to understand it, they had to decode or deconstruct it). Consequently, a map should be perceived as a gradual process in which local connections of map elements lead to overall integration of map units (Shimon as cited by Gerber, 1981). Warwick (1987) affirming the observations above, noted that overall integration of issues on a map would be challenging unless the visual perception of maps (pictures inclusive) by pupils were sharpened by systematic practice.

The discourse above by Gerber, Shimon and Warwick just goes to validate the findings of this study which revealed that pupils complained that mapwork was difficult/confusing/mathematical and that their teachers had not taught them. The

situation was compounded by the revelation from most pupils that they had learnt mapwork less than five times in three years (from Grade 10 to12).This kind of scenario tended to put off some pupils in spite of their liking of mapwork.

(c) Pupil factor

This researcher also noted that in some High schools, geography was offered both as a compulsory and optional subject depending on which class a pupil belonged to. For instance, most pupils in pure science classes were allowed to take geography as an optional subject while those in arts classes took geography as a compulsory subject. The perception the researcher got on the ground was that geography was reserved for the pupils who were weak in mathematics and pure sciences. This has serious implications in that it could be the very same pupils who were weak in mathematics and physics that, later on, came to complain that mapwork was difficult/confusing/mathematical.

Teachers of geography in this study, when asked about why some pupils failed to state why they liked mapwork, said it was possible to have Grade 12 pupils who failed to express themselves in writing because some passed Grade 9 examination through leakages. Passing through leakages had a multiplier effect and the same pupils might leak their way to higher institutions of learning and become teachers of geography just to go and fail to deliver adequately in schools. This creates a vicious cycle.

In the same vein, Morgan and Lambert (2005) contended that different groups of children display different abilities in terms of mapping. This would not be surprising since the age range of pupils in this study was between 15 and 22 years. The implication of this is that it is not surprising that pupils with such a wide age range could possess different abilities.

It must have been this recognition of pupils' different abilities when it came to manipulating maps that propelled Linn and Petersen, (1985) and Gardner, (1985) to espouse the concept of spatial ability. According to these three authors, *spatial ability* referred to skill in perceiving the visual world, transforming and modifying initial perceptions, and mentally recreating spatial aspects of one's visual experience without the relevant stimuli. Three categories of spatial abilities, namely, spatial orientation, spatial perception and spatial manipulation were distinguished by Linn and Petersen, (1985) and Gardner, (1985) Linn and Petersen, (1985) and Gardner, (1985). *Spatial orientation* is the ability to keep track of objects or locations in space even after a rotation or movement to a new location. *Spatial perception* involves determining spatial relationships with respect to gravity or one's own body in spite of distracting information; and *spatial manipulation* involves the ability to mentally rotate two- or three-dimensional figures rapidly and accurately. These abilities were also noted by Simukoko (1979). Spatial abilities developed, in part, when children manipulated and explored objects and environments. In general, there tends to be a strong relationship between how well one performed on verbal tasks and non-verbal tasks. However, some people are more skillful in one area than another, thus, the need for recognising and valuing pupils' strengths with different abilities. The implication of the discourse above to this study is that there would be no harm to conduct some kind of aptitude tests in mapwork for pupils wishing to take geography. The idea is to assess whether pupils intending to take the subject possess the abilities above. The details of which could be another area of research.

In the same line of thought as above, on spatial ability, Piaget, as cited by Boardman (1983) proposed that children will go through three stages of *spatial understanding*,

namely, *topological, projective, and Euclidean.* Topology related to the concept of proximity, which translated, is the ability to comprehend routes on a map. This normally takes the form of plan maps where points in space are linked together by routes. The second stage of spatial development is the ability to comprehend projective space which essentially is the representation of three-dimensional objects either in observation or plan form. This is closely related to the growth of the ability of children to put themselves into the position of other people and view objects from their point of view. Some maps are drawn in projective form (e.g. tourist maps with buildings represented in elevation) to aid understanding and recognition. The last and final stage of spatial development is the ability to recognize Euclidean space which refers to the *spatial geometry of the mind'* in which the relationships of objects in space are structured in terms of horizontal or vertical lines, squares, rectangles, triangles and circles' (Boardman, 1983: 11). Simply put, it is the ability to understand abstraction and symbolism which are prevalent in almost all maps. The concept of spatial geometry of the mind is actually closely linked to the Newtonian worldview in which everything about natural phenomena must be understood in mathematical terms as acknowledged by Capra (1983) in part 2.5. Hence, the high dosage of mathematics and physics in mapwork may explain some of the challenges pupils faced when dealing with mapwork and, consequently, their attitudes towards it and complaints of little time when dealing with it.

(d) Teacher factor

With respect to teacher factor, the results of this study have serious implications in that there were close to half of the pupils in examination classes (Grade 12) who indicated that they had never learnt mapwork since Grade 10. This meant most of the pupils were

generally never prepared by their teachers by the time they went to examinations or the quality of learning they received in mapwork left much to be desired. It was "academic injustice" to pupils, in an examination class, to meet their teacher less than five times over a period of three (3) years in a practical component of a subject (in this case mapwork). No wonder, some pupils developed a negative perception towards mapwork because there was either little or no contact between teachers of geography and their pupils regarding mapwork. This was worsened by the fact that most of the mapwork aspects were mathematical in nature and mathematical concepts required practice constantly to manipulate easily. This was consistent with the geography teachers' responses that pupils lacked practice in mapwork, and were not taught mapwork at senior level, or inadequate time was devoted to mapwork.

What is remarkable from the results is that the percentages of pupils who indicated that they liked the way their geography teachers taught mapwork is more by only 1.6 percent compared to those who indicated that they did not like the way their geography teachers taught mapwork. It appeared the idea of asking pupils to evaluate their teachers' performance in mapwork put some of them in a very awkward situation. Hence, they opted to remain neutral (non-committal). The implication for this study is that it is vital for teachers, in particular and the Ministry of Education in general, to encourage fellow teachers to evaluate themselves with the help of pupils with a view to improving service delivery and "customer care." The teacher's "customer" is the pupil thus, pupils should be given chance to state their opinions, views and experiences about the way a particular service has been or is being delivered to them. In the process, constructive criticism and critique should be encouraged, but these are habits that are inculcated, they do not come

by accident. The practice should start from colleges and universities, and eventually, will have a trickle down effect to the last man or woman on the ground, in schools. The various reasons for pupils' positions and views on why they felt the way they did about the manner in which their geography teachers taught mapwork are discussed below.

Pupil respondents who indicated that they liked the way their geography teachers taught mapwork were given opportunity to state the reasons for their stance. They advanced the following reasons: their teacher taught with enthusiasm; their teacher explained using teaching resources; their teacher ensured everybody understood; their teacher illustrated with examples; their teacher explained concepts very well; their teacher was interesting and confident; their teacher hinted on how to approach mapwork and their teacher was patient and encouraging. Some pupils gave no reasons for their position.

From the results, it is clear that more pupils liked the way their geography teachers taught mapwork, essentially, because of the way their teachers handled content or subject matter. As stated earlier on, teachers are service deliverers and their "customers" are pupils (students). Hence, at the end of the day, the customer would be a better judge of the quality of service delivered. Notwithstanding the fact that various customers have various tastes, preferences and biases in the manner the service is delivered or packaged and the time it's delivered, it is important to note that the question and answers received emphasised on the service delivered and not the service deliverer. Meaning the question was not interested in telling the researcher whether their teacher was short, dark, light in complexion, ugly, beautiful and so on but was focusing on the quality of the service

delivered, in this case mapwork. It appeared the few teachers who taught mapwork taught it very well going by the accolades accorded to them by pupils in this study.

The study also gave opportunity to pupil respondents who indicated that they did not like the way their geography teachers taught mapwork to give reasons for their stance. They gave the following reasons: had never been taught mapwork, the teacher was boring, the teacher barely taught mapwork, the teacher was too theoretical/abstract, the teacher did not explain well and their teacher was not serious. Some pupils gave no reasons.

From the reasons given in the paragraph above, two were remarkable. First, the fact that some pupil respondents indicated that they did not like the way their geography teachers taught mapwork because their teachers had never taught them. It appeared pupils felt a "breach of trust" (or is it contract) where the service deliverers (teachers) failed to deliver a service (product). In this case, the judgement was based on the failure of the service deliverer to deliver the product and not on the service delivered itself. Second, the fact that some pupil respondents indicated that they did not like the way their geography teachers taught mapwork because teachers barely taught mapwork, teachers being boring and teachers not explaining mapwork very well were very serious allegations that bordered on academic injustice to pupils and the geography syllabus in general, and in particular the mapwork component.

One would not be far from the truth by supposing that the pupil respondents who indicated that they did not like the way their geography teachers taught mapwork because

they had never been taught by their teachers were citing their geography teachers for "contempt of mapwork." There is more about this concept in the paragraph below.

From the findings of this study, it is clear that more respondents who indicated that they neither liked nor did not like the way their geography teachers taught mapwork indicated so because they had never been taught mapwork. Probably, one would suppose they were following the principle practised in Zambian courts of law which presumed that an accused is innocent until proven guilty. It would seem that these pupils felt it was unfair to judge a teacher on an action he/she had not taken (in this case, commenting on how the teacher taught mapwork which he/she had not taught, but was supposed to teach). However, in the same Zambian courts of law, even if one was innocent until proven guilty, but decided to miss his/her court sessions without reasonable cause, the presiding judge (magistrate/justice) would cite one for contempt of court. And those pupil respondents who were non-committal did not want to cite their teachers of geography for "contempt of mapwork." One would suppose, they used their discretion just as judges would use their discretion in courts of law. Probably they exercised leniency or were intimidated (fear that after the researcher had gone, they could be put to task to confess what they had written about their teacher. However, respondents' confidentiality was assured by not allowing respondents to write their names on the questionnaires). Suffice to say that some pupils were non-committal and their teachers of geography were not on trial except their teaching of mapwork came under close scrutiny.

From the findings, the study showed that selected High schools in the Copperbelt Province had more Secondary Diploma holders who were teaching geography compared

to Degree, Certificate, and Masters degree holders respectively. According to MoE (1996:111), "In theory, university graduates teach Grades 10—12. However, in practice because of the shortage of university trained graduates, diploma holders may be required to teach Grade 10—12 classes." This raised issues of more geography teachers in this study being diploma holders and this revelation was consistent with the findings of Lungu (2006) who found that 57 percent of geography teachers in Luangwa district were diploma holders. Lungu (2006) contended that matters of geography teachers' qualifications brought into focus and close examination issues of quality and effectiveness in service delivery. And what was very sad about this study is that none of the female teacher respondents were degree holders. Additionally, when some teachers were asked why pupils performed poorly in mapwork in the final examination, they indicated that some teachers themselves were not trained geography teachers and were ignorant about the aspects of mapwork. The question is where do graduate teachers go?

The findings of the study show that more teachers indicated that their schools offered geography as an optional subject. These findings are in resonance with the pupils' responses which indicated that geography was offered to them as an optional subject. This researchers' contention is that one of the reasons why some geography teachers were alleged to have a casual approach to mapwork and not serious with it could be due to its status as an optional subject in most of the High schools in the study. It is important also to bear in mind that an optional subject is one that may be chosen or not as one wished. On the part of some teachers, unfortunately, an optional subject would be a subject that may be taught or not as one wished.

Professor Mwansa, as cited by Munthali (2005) contended that teachers at all levels of the education ladder in Zambia were dissatisfied and as such were not performing as expected. He appealed to government to improve teachers' conditions of service so they could apply themselves effectively. Professor Mwansa further argued that qualifications were not an issue in terms of performance of teachers because qualifications did not make a good teacher, but they (qualifications) only provided confidence. He also argued that education of people was a calling and teachers needed to have a vision and commitment apart from acquired knowledge to perform. Professor Mwansa's view is complementary to that of Lungu (2006) in that Lungu (2006) focused on the qualification of the teacher while Mwansa was focusing on a well paid (motivated) teacher who must be qualified. Suffice to say that teachers' dispositions and other teacher related characteristics (professionalism and motivation) had an influence on the way pupils perceived mapwork. In other words, the way teachers behaved towards mapwork could influence pupils' attitudes to mapwork.

(e) Methodology factor

From the results of this study, what was notable was the indication by the majority of pupils and teachers who indicated that they had never been taught and had never taught mapwork respectively outside the classroom. The results were consistent with pupils' complaints that their teachers were too theoretical/abstract. This hinges on methodology in that mapwork is a practical component that required practice in the real world to make sense, instead of the artificial classroom environment. No wonder, pupils and teachers themselves in this study, recommended that pupils should be taken out for mapwork tours and that teachers of geography should improve their methodology.

Teacher respondents who had not taken their pupils out for mapwork fieldwork were asked to state why they had not taken their pupils out to teach them (pupils) about aspects of mapwork. These teachers indicated that they could not take their pupils out to teach them about aspects of mapwork for the following reasons: due to a heavy teaching load, lacked funding from administration, lacked transport to take pupils out, were still new at their school, inadequate geography periods, teaching the subject (geography) for the first time(such teachers were compelled to teach other subjects because of staff shortages in schools), had never thought of it, had inadequate/limited time to take pupils out to teach them about aspects of mapwork. Some teachers gave no reasons for not taking pupils out for fieldwork to teach aspects of mapwork in spite of being reminded they had left the part unanswered. The conclusion of this researcher was that for some teachers, it was just because of laziness and frustrations. For others, it was because they had other 'better things to do' such as attending to private tuition classes when they should have been planning for their field tours).

In the same line of though about methodology, Piaget, as cited Boardman, (1983), argued that mapwork teaching, thus, should not merely be confined to receptive methods of learning, but instead positive involvement of children using active methods of learning should be encouraged. Rickinson et al., as cited by MacEachren (1995), contended that outdoor activities when carried out with pupils had four possible areas of impact on learners, namely: (i)Cognitive impacts (concerning knowledge, understanding and other academic outcomes); (ii) Affective impacts encompassing attitudes, values, beliefs and self-perceptions; (iii) Interpersonal/Social impacts (this includes communication skill,

leadership and teamwork) ; and (iv) Physical/Behavioural impacts (relating to physical fitness, physical skills, personal behaviour and social actions).

With respect to the subject of methodology and functions of maps, Morgan and Lambert (2005), argued that maps were a reflection of what was on the ground and that they were always social products to be critically appreciated from their contexts of production and usage thereby, playing a symbolic role because of their links to politics (power relations). This is a view underscored by Freitag (1993) too.

In order to enable students (pupils) to critically analyse geographical issues in the classroom (this researcher would like to add even outside the classroom), Morgan and Lambert (2005) suggested four perspectives which should form the basis of critical discussion, namely, (i) economic space (i.e. pupils could critically analyse the economic messages brought out by a map e.g. types of jobs), (ii) social space (i.e. analyse settlement patterns in relation to economic factors, and so on), (iii) environmental issues (which this researcher would coin as 'environmental or natural space' i.e. what ideological or world views are signified by the decisions made in the usage of resources depicted on a map), and (iv) theoretical issues (what this researcher would call 'political space' i.e. the political conspiracy to be taken into account when deconstructing the map e.g. the British world maps put Britain in the middle to demonstrate supremacy). The four perspectives by Morgan and Lambert (2005) above are in line with issues brought out by Namafe (2006) regarding a broader and critical understanding of Environmental Education and the various affairs at play (i.e. Political affairs, Economic affairs, Social affairs and Natural affairs when analysing environmental education and metaphors).

What these authors above suggest, has serious pedagogical implications for mapwork teaching, is that geography teachers and their pupils need to seriously interrogate (assuming they were trained to do so) the nature of the knowledge that finds its way in the classroom. This would require a serious over haul of the time given to geography (mapwork in particular) in the curriculum, the calibre of pupils brought to geography classes, and the professional calibre of teachers of geography brought to teach pupils in High schools and their geography education training. In other words, what is suggested above is a problem solving approach to mapwork which would be more exciting to pupils.

Fay (1981), in the same vein, observes that understanding maps is achieved in (sustainable) stages. It seemed futile to expect pupils to be able to interpret maps until they had learned to read and follow them. This required putting the pupils in a situation where they had to follow maps on their own (i.e. child-centred approach to understanding maps).

In a bid to add spice to mapwork methodology, Hunt (1981) presented a framework about the ten (10) commandments a map represented (represents). He introduced a mnemonic (a word designed to help remember) to aid in the A B C of map drawing for learners. This was meant to make it easy to memorise, recall and apply. The mnemonic took the form of the ten (10) letter word, REPRESENTS. REPRESENTS was a suitable choice for the mnemonic since maps were a representation. Hunt's (1981:26-7) expanded mnemonic was as follows:

i. Readable (maps should be simple, clear and neat),

ii. Equipment (includes HB pencils, rulers, soft rubbers, coloured pencils and pens),

iii. Pencil (draw line faintly but visibly using pencil first),

iv. Rectangle (a map should have a box around it),

v. Enlarge or reduce (different maps require different proportions),

vi. Scale (a line scale should be on every map to relate the map and the ground),

vii. Entry (the key/legend, guides on symbols /shapes used on the map),

viii. North point (helps in orientation of maps),

ix. Title and lettering (to be simple, clear and to state the map purpose, name places) and

x. Shading and colour (help to differentiate different areas).

The benefits of this mnemonic were that it arose from the fact that it was easily applied and teachers could use it as a marking key for learner's maps in the field or classroom (Hunt, 1981). The significance of Hunt's mnemonic is that it advises on some of the interesting (child-centred ways) in which map activities could be introduced in the classroom at lower levels of school but could be adapted to serve senior levels as well.

(f) Utility factor

From the study results, what was interesting was that one fifth of the pupils did not indicate ways in which mapwork would be useful to them after leaving school. This could mean they did not find any use for mapwork especially that even while in High school mapwork seemed terribly and dangerously neglected by their teachers. Probably, this should not be limited to mapwork but other areas of geography too. The implication for this study is that teachers and pupils should ask critical questions about why and how certain aspects of geography and mapwork would be useful to pupils after leaving school

or in life. It is vital that teachers motivated their pupils to see or visualise the future value of things they were learning today. This is important in the context of the stiff competition geography was facing from other social science subjects alluded to earlier.

The study also revealed that the minority of the pupils indicated that they would enjoy geography without a mapwork component. Among the reasons they alluded to were that: geography would be less challenging (content factor), teachers did not teach mapwork (teacher factor), the syllabus for geography was too long (content factor), mapwork was too confusing (content factor), mapwork was time consuming (time factor), geography would be more interesting and exciting (content factor), mapwork had no application in daily life (utility factor), mapwork was difficult (content factor), mapwork reduced pupils' chances of passing geography (utility factor). Some gave no reasons (This could mean they were at a loss of what to say or were not inspired enough by the teacher to see the value in maps). As indicated earlier on there was an interplay of these factors as the arrows in Figure 18 demonstrate.

On the other hand, the study also discovered that the majority of the pupils indicated that they would not enjoy geography without a mapwork component. This was consistent with the earlier results discussed in Part 6.2 above where more pupil respondents indicated that they liked mapwork. For pupils who indicated they would not enjoy geography without a mapwork component, the reasons cited among others included the following: mapwork gave them knowledge of location (utility factor), mapwork gave them knowledge of features (utility factor), mapwork would help them in future career development (utility factor), mapwork gave them knowledge of places (utility factor),

mapwork helped them answer some research questions (utility factor), mapwork was educative (utility factor), mapwork gave them a clear picture of issues (phenomena) (utility factor), mapwork helped in locating places (utility factor), *mapwork was easier,* mapwork enhanced imagination and critical thinking (utility factor), mapwork empowered one with map reading skills that were vital ((utility factor), *geography and mapwork were inseparable, geography would be meaningless, mapwork was interesting,* mapwork was a practical component ((utility factor), mapwork enhanced chances of passing and that mapwork helped in finding direction (utility factors). Some gave no reasons (This could mean they were at a loss of what to say by virtue of calibre (pupil factor) or were not inspired enough by the teacher to see the value in maps (teacher factor). The reasons in italics were related to content factor, but as indicated earlier on there was interplay of these factors as the arrows in Figure 18 demonstrate.

Reasons for and against the idea of geography without mapwork component cited by various pupil respondents above were so varied and just went to show how various pupil perceived the importance of geography and mapwork respectively. The only thing that united or brought them together was that all of them were High school pupils in a geography class. The reasons were as varied as the pupils themselves. In a way, this brings in the pupil factor. This meant different pupils perceived mapwork utility differently.

(g) Other factors (e.g. co-curricular activities, materials)

Regarding other factors, specifically co-curricular, none of the High schools in the study had a geography club. A few High schools had inactive Conservation clubs whose focus

may not have been cartographical unless the teacher was creative. The implication of this is that, outside normal classroom periods of geography, pupils taking geography would not have any opportunity to discuss and share pressing and challenging geographical problems in general, let alone mapwork. As Professor Mwansa cited by Munthali (2005) observed, education was not a matter of the classroom setting, but a process that continued even outside the institutional set up.

Apart from that, geography clubs would encourage pupils to plan for excursions with the blessings of their various administrations. Geography clubs were indeed dead in the schools cited in the study because of the following reasons:

- ✓ teachers were too busy with private tuition classes,
- ✓ teachers were overloaded with teaching periods some of which included Academic Production Unit (APU) classes that came in the afternoons,
- ✓ teachers of geography were also compelled to teach other subjects other than geography(due to staff shortage),
- ✓ low morale among teachers to engage in extra-curricula activities like being patrons or matrons of geography clubs from which they would not have any monetary gains, let alone support from the administration for the benefit of pupils.

Suffice to say, geography clubs were none existent in schools that were in the study and consequently, it was the pupils who suffered in the process because they had no forum to air their cartographical concerns outside the normal geography periods. This was worsened by lack of updated books on mapwork. Most of the books available in the schools were obsolete (described as being older than pupils themselves).

What this discussion on the factors influencing High school pupils' attitudes towards mapwork highlights as manifested in Figure 18, is the complexity, multifaceted and overlapping nature of issues surrounding High school pupils' dismal performance in school certificate geography mapwork component. The solution to alleviate or mitigate the problem of dismal performance of pupils in mapwork would also require a multi-faceted and multi-disciplinary approach to alleviate or mitigate the situation meaning various stakeholders have to sit down and digest the issues raised in this study to chart a way forward.

6.4 Mapwork Item perceived to be most challenging and why?

The third research question and objective sought to establish the aspects of mapwork perceived most challenging by High school pupils and why? The findings of this study revealed that a surprising high percentage of pupils did not indicate any mapwork aspects they perceived most challenging. However, among the actual aspects indicated, six figure grid reference had the highest percentage. The middle percentage indicated that calculation of area was most challenging while the lowest percentage indicated that four figure grid reference was most challenging.

As regards the surprising high percentage of pupils who did not indicate the mapwork aspects they found most challenging, what could be inferred is that they might have been put in a very awkward situation by virtue of not having been taught map work aspects by their teachers to enable them establish which one was most challenging. In the same vein, the percentage of pupils who gave no reason for perceiving certain mapwork aspects

most challenging is equally high. Regarding the reasons for finding six figure grid reference most challenging the reason advanced by pupils were as follows:

- how to find six figures when the map has four,
- it involved a lot of things and forgetfulness,
- no reason,
- did not understand it,
- confused it with four figure grid reference ,
- it confused many pupils,
- required very precise readings,
- involved calculations(i.e. mathematics) and
- it was complicated.

What can be surmised from the reasons cited for finding six figure grid reference most challenging is the high dosage of mathematical principles associated with six figure grid reference that compounds the complexity of it and thus confusing pupils. This is in light of the much borrowing by cartographers from the Cartesian coordinate system modelled after the Newtonian world view of perceiving natural phenomena in mathematical terms (adapted from Capra, 1983). This scenario is worsened by the little time devoted to mapwork and the little practice afforded to pupils to apply what they had learnt in new and real situations.

Regarding the middle percentage of pupils who indicated that calculation of area was most challenging to them, the reasons that were adduced were as follows:

- did not understand how to calculate it,
- had never learnt this topic before,
- No reason,
- Not done (taught) practically,
- It was not well explained,

- difficult for places one had never been to and
- difficult to tell boundaries on the map.

Yet again, most of the pupils complained that they had never been taught calculation of area. In the few instances the topic was taught, pupils complained that it was not well taught or was too abstract.

With respect to the lowest percentage of pupils who indicated that four figure grid reference was most challenging to them, the reasons were attributed to the following:

- teachers did not teach mapwork,
- difficult to understand clearly and
- had a lot of calculations (i.e. mathematics).

What is interesting to note from the reasons given yet again is that teachers did not teach (when they should have done so) and this was made worse by the mathematical manipulations involved which somehow made it difficult to understand (here readers are referred to the point made in item 2.5 of this dissertation) especially if pupils were not taught.

The next chapter discusses conclusions and recommendations of this study.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.1 Conclusions

The following can be concluded based on some of the pertinent findings of this study. Firstly, the study established that more High school pupils (72.6 per cent) on the Zambian Copperbelt liked mapwork or had a positive disposition towards mapwork as a component of geography. Secondly, the study also established that High school pupils' attitudes towards mapwork were influenced by the interplay of the following key factors: (a) Teacher factor; (b) Time factor; (c) Content factor; (d) Methodology factor; (e) Utility factor; (f) Pupil factor and (g) Other factors (e.g. co-curricular activities).

Thirdly, the study established that the mapwork aspects perceived to have been most challenging by pupil respondents were three and were ranked as follows by percentage (i.e. the major reasons why they perceived the stated mapwork aspects most challenging are in brackets): (i) six figure grid reference, (12.4 %) was the highest (Reasons: required very precise mathematical answers and was confusing); (ii) Calculation of Area, (4.7 %) was the middle percentage ((Reasons: never been taught, not well explained, not done practically, difficult to tell boundaries on a map, difficult for a place one has never been to) ; and Four figure grid reference, (1.1 %) was the lowest ((Reasons: Teachers did not teach, difficult to understand clearly and was mathematical).

The main conclusions of this study were that High school pupils' attitudes towards mapwork on the Copperbelt were generally positive. Therefore, this study submits that the reasons for pupils' dismal performance in mapwork section could be attributable to

other reasons other than attitudes. This means attitude is not so much a factor in high school pupils' dismal performance in the mapwork component of school certificate geography and that the factors behind the dismal performance are multi-faceted. They need further understanding.

It is hoped that the Ministry of Education (MOE) and various stakeholders (i.e. Colleges of Education, Curriculum Development Centre (CDC), Examinations Council of Zambia (ECZ), University of Zambia especially, Departments of Geography and Language and Social Science Education) will use the findings of this study and consider them to valuable so that they are made to be a stepping stone for pupil-centred or pupil-driven initiatives.

7.2 Recommendations

In view of the foregoing findings, the author proposes the following recommendations aimed at addressing and mitigating the identified challenges and weaknesses in the manner mapwork is taught and learnt. In the same vein, the author further recommends measures aimed at taking advantages of the opportunities that remain unexplored:

7.2.1 Schools should purchase topographical maps specifically for their location from the Ministry of Lands. This would be a good starting point for practical mapwork within the school grounds or community to remove the concept of teaching in abstract.

7.2.2 Team-planning and Team-teaching should be encouraged among teachers of geography, especially, on aspects of mapwork they are not conversant with. This is in view of the fact that some teachers were ignorant or not trained geographers.

The idea is to enhance mental cross-pollination of ideas. This would also help teachers to critically evaluate and improve their mapwork methodology.

7.2.3 Heads of Sections, Geography, with the support and assistance of Heads of Departments, Social Sciences, should endeavour to create/establish Geography Resource Rooms which among other things should stock maps of different kinds, mapwork equipment and books, and computers (computers installed with a lot of geographical and mapwork software) to mention but a few.

7.2.4 Geography clubs should be revived because they could form a vital and viable avenue of making whatever is taught in geography be linked to practical and day to day life issues.

7.2.5 Geography periods should be increased from the commonly prevailing 3 to 4 periods to somewhere around 6 to 7 periods per week as the current practice is with Sciences, English and Mathematics. The idea of giving certain subjects less periods than others demeans their (the subjects') standing in the perception of the pupils and teachers. The number of learning hours should be increased to accommodate this change.

7.2.6 Mapwork examination questions for Grade 12 classes should be separated from Geography Paper 1 as the case was at the time of compiling this document.. This would make mapwork to be more educative, be explored fully and even be more interesting since objective and subjective questions would be set. Subjective questions would allow pupils to justify their answers, something they cannot do in the current set up. Furthermore, this would allow pupils learn to be logical, critical and look at how items on a map are related to the bigger picture of things (i.e. the

spatial relationships on the map). However, nothing will change unless other factors influencing pupils' attitudes to mapwork are attended to.

7.2.7 Teachers should seriously spend and put in more time and effort in mapwork. This would give teachers an opportunity to hint on how to answer/approach mapwork questions in the examination. This would also ensure mapwork is consistently and systematically taught from Grade10 to 12 and would make it less confusing.

7.2.8 Pupils should be taken out for mapwork tours with activities which should be based on Zambian maps and not foreign maps as the case was at the time of compiling this document.

7.2.9 The Ministry of Education should seriously and consistently employ more trained geography teachers and provide mapwork books and equipment to all High schools.

7.2.10 Co-operation between Geography and Mathematics Departments should be enhanced in order to liaise over the mathematical portions of mapwork that pose serious challenges to both pupils and teachers.

7.2.11 The Examination Council of Zambia in conjunction with the Curriculum Development Centre (CDC) should work towards allocating more marks to mapwork section to motivate pupils and teachers to put in a little more effort in mapwork than was the case at the time of compiling this research.

It is hoped that the recommendations of the study will be of value to the Ministry of Education and other various stakeholders alluded to in the conclusion who may be interested in conducting further comparative research in the area of mapwork, this could

even be at High school or junior secondary levels. Finally, it is important to note that the teaching and learning of mapwork in the selected High schools on the Zambian Copperbelt still leaves much to be desired unless serious intervention measures are put in place to reverse or mitigate the situation.

7.3 Suggestions for future research

Based on the findings of this study, interested researchers may wish to explore some of the following issues which this study merely scratched on the surface:-

7.3.1 What are the differences in perception of mapwork between male and female pupils? This study could not confidently comment on such differences mainly because there were more female than male respondents who were interviewed in this particular study. Such a skewed situation could not have been used to generate useful comments of differences between the two sexes.

7.3.2 Determine the exact Mathematics and Physics content of school certificate mapwork.

7.3.3 Investigate the ranking of the following subjects offered under the social sciences departments in High schools, namely Geography, History, Religious Education and the newly introduced Civic Education and why there is so much competition amongst them.

7.3.4 Understand further the multi-faceted interplay of factors behind the dismal performance of High school pupils in school certificate mapwork.

BIBLIOGRAPHY

Azar, B (2002) *Map-reading at early age boosts spatial skills*. From the web, http://www.apa.org/monitor/jun97/spatial.html.

Banda, M., (1991), An Investigation into the Root Causes of the Factors Affecting Geography Teachers' Classroom Performance at Junior and Senior Secondary School Levels in Zambia. UNZA, Lusaka.

Board. C., (1967), "Maps as models" in Chorley, R.J. & Haggett, P. (eds) Models in Geography. Methuen & Co Ltd, London. pp. 671 – 725.

Boardman, D., (1983), Graphicacy and Geography Teaching. Croom Helm, London.

Boardman, D., (1986), "Maps and Mapwork" in Handbook for Geography Teachers. The Geographical Association, Sheffield.

Brook, Diane L., (1977), "Students' Attitudes towards Geography" Journal of Social Studies Research, 1, 2, 60-9, Sum 77. From http://www.eric.ed.gov

Bwalya, T.M., (1989), "School Survey on Current Teaching and Examining of Geography in Zambia Senior Secondary Schools" in Zambia Geographical Association Schools Supplement No 1, 1989 ZGA, Lusaka.

Clarke, K.C., (2000), *Getting Started with Geographic Information Systems,* Prentice Hall. From http://maps.unomaha.edu/Maher/linked/Week%201&2/method&maps.html

Capra, F., (1983), The Turning Point: Science, Society, and the Rising Culture. Bantam Books, Toronto.

Carter, J. R., (1988), *Six Dimensions to an Understanding of How and Why Maps are Used.* From http://www.ilstu.edu/~jrcarter/mapuse/index.html

Catling, S. J., "Map Use and Objectives for Map Learning" in Teaching Geography, Geographical Association, Volume 6 No 1, July 1980. pp15-17.

Cayne, B.S., et al (1967), (editors) Merit Students Encyclopedia. Collier Educational Corporation, Crowell.

Columbia University (2003), Columbia Electronic Encyclopedia, sixth edition, Columbia University Press, Columbia.
Chancellor, D., (2004), Maps and Mapping. Kingfisher Publications, London.

Cox, A., (1982), "Think as a Winner". From http://www.mindpowernews.com

CSO (2003), Summary Report for the 2000 Census of Population and Housing, Desktop Publishing Unit, CSO, Lusaka.

Demirkaya, H. and Aribas, K., (2004), "Students' attitudes towards geography." From (http://www.doaj.org/doaj?func=abstract&id=202018)

Downs, R.M., & Stea, D., (1977), Maps in Minds: Reflections on Cognitive Mapping, Harper & Row , New York.

Foote, K.E., and Crum, S., (1995), *The Value of Maps*. From http://www.colorado.edu/geography/gcraft/notes/cartocom/cartocom.html

Fray, N., "Understanding Maps— a 'Child-Centred Approach'" in Teaching Geography, Geographical Association, Volume 7 No 1, July 1981.pp39-40.

Freeman, T.W., (1965), A Hundred Years of Geography , Gerald Duckworth & Co Ltd, London.

Gardner, H., (1985), Frames of Mind: The Theory of Multiple Intelligence. Basic Books, New York.

Gerber, R., "Young children's understanding of the elements of maps" Teaching Geography, Geographical Association, Volume 6 No 3, January 1981.pp128-133

Gerber, R.V. & Wilson, P., (1984), "Using maps well in the geography classroom" in Fien, J., Gerber, R. & Wilson, P. (eds) *The Geography Teacher's Guide to the Classroom 2nd ed.* The Macmillan Company of Australia Pty Ltd, Melbourne. pp. 146 – 157.

Gopsill, G.H., (1967), The Teaching of Geography. Macmillan Educational Ltd, London.

Gould, P. & White, R., (1986), Mental maps (2nd edition), Allen & Unwin, Boston.

Graves, N.J., (ed) (1982), New UNESCO Sourcebook For Geography Teaching. The UNESCO Press, New York.

Greenwood, D., (1960), Mapping University of Chicago Press, Chicago.

Harley, J.B. & Woodward, D., (1987), The History of Cartography: Cartography in prehistoric, ancient, and medieval Europe and the Mediterranean. University of Chicago Press, Chicago.

Hartig, G., (1908), The Catholic Encyclopedia, Volume IV, Robert Appleton Co, New York.

Hunt, M, J., "The Ten Commandments a Map Represents" in Teaching Geography, Geographical Association, Volume 7 No 1, July 1981.pp26-27

IAAMSS (1967), The Teaching of Geography in Secondary School, Cambridge University Press, Cambridge.

Jackson, J.A. and Bates, R.B., (1997), The Glossary of Geology, American Geological Institute, Oregon.

Jolly, D.C., (2006), *Factors affecting the value of* maps. From http://www.rare-maps.com/mc_factor.cfm 561

Jones (2002), Geography and mapwork at Abergwaun :An inspectorate report.

Kulhavy, R.W., Stock, W.A., & Kealy, W.A., (1993), "How geographic maps increase recall of instructional text" in Educational Technology Research and Development, 41(4), pp. 47 – 62.

Linn, M. C., and Petersen, A .C. A., "Emergences and Characteristics of Sex Differences in Spatial Ability: A Meta-Analysis." Child Development 56 (1985):1479-1498.

MacEachren, A.M., (1995) *How Maps Work: Representation, Visualization and Design.*: The Guilford Press, New York.

McCrone, T., Morris, M. and Walker, W., (2005), *Pupil Choices At Key Stage 3: Factors Showing How Young People Choose Their Optional Subjects*, National Foundation for Educational Research. From http://www.dfes.gov.uk/research/data/uploadfiles/RW68.pdf

McMillan, J. H., "Factors affecting the development of pupil attitudes toward school subjects" in Psychology in the Schools Volume 13, Issue 3 , February 14, 2006 Pages 322 – 325

Meux, A.H., (1966), Reading Topographical Maps. University of London Press, London.

Ministry of Education (1979), Educational Reforms. Curriculum development centre, Lusaka.

Minshull, R., (1970), The Changing Nature of Geography. Hutchinson University Library, London.

Monmonier, M., (1993), Mapping it Out: Expository cartography for the humanities and social sciences. The University of Chicago Press, Chicago

Montello, D.R., (2002), "Cognitive map-design research in the twentieth century: Theoretical and empirical approaches" in Cartography and Geographic Information Science, 29(3), pp. 283 – 304.

Morgan, J. and Lambert, D., (2005) Geography: Teaching School Subjects 11-19 series, Routledge Taylor and Francis Group, London.

Muir, S.P., "Understanding and Improving Students' Map Reading Skills" The Elementary School Journal, Vol. 86, No. 2. (Nov., 1985), pp. 206-216. http://www.jstor.org/journals/ucpress.html.

MOE (1996), Educating Our Future. Ministry of Education, Lusaka.

Muehrcke, P.C., Muehrcke, J.O. and Kimerling, A.J., (2001) *Map Use: Reading, Analysis and Interpretation.* From the web http://www.ilstu.edu/~jrcarter/mapuse/level-use.htm

Munthali, Nyamwaya, "Poor Teachers' Conditions of Service Affecting Education-Prof Mwansa," The Post, Tuesday, January 11, 2005.

Noorden, P.V., (2001), "Teacher perceptions of geography in Australia" in Conolly, G. Promoting geography in schools: This is what we do to promote geography in our schools. National Geography Support Group, Australian Geography Teachers' Association, Gladesville. From http://www.agta.asn.au/htm_files/other_files/geographysplace.pdf

Namafe, C.M., (2006), Environmental Education in Zambia: A Critical Approach to Change and Transformation. University of Zambia Press/School of Education, Lusaka.

Okpala, J. (2000) "Image of Geography in Nigeria: Past, Present and Future. International Research in Geographical and Environmental Education, Volume 9, No. 2, 2000.

Ormerling, F., (1999), *Personal Communication.* From the website, http://www.ilstu.edu/~jrcarter/mapuse/level-use.htm

Piaget, J., (1972), The Child and Reality Editions Denoel, Paris.

Satterly, D.J., (1973), "Skills and Concepts Involved in Map drawing and Interpretation" in Perspectives in Geographical Education Graves, N et al, Oliver and Boyd, Edinburgh.

Simukoko, R.J., (1979), "Towards Improving Junior Secondary School Map work in Zambia" in ZGA Schools Supplement No 7, 1979. ZGA, Lusaka.

State University (2007), "Teaching of Geography-Effectiveness of Instruction, Maps and Spatial Concepts, Evaluating Geographic Learning". From http:// education.stateuniversity.com/pages/2007/Geography-Teaching.html

Stephens, D, "Making Sense of Maps," *History Matters: The U.S. Survey Course on the Web,* http://historymatters.gmu.edu/mse/maps/, February 2002.

Songguang, H., (2005) Seeing the World through Maps: A Study of Maps in Geographic Education in Singapore, Department of Geography , National University of Singapore.

Van der Schee, J., (1988) "Thinking geography with maps" in Gerber, R.V. & Lidstone, J. (eds) *Developing Skills in Geographical Education.* Australia: International Geographical Union Commission on Geographical Education. pp. 76 – 79.

Vene, B., (2007), "Is Intelligence necessary for success". From http://www.mindpowernews.co

Walford, R., (ed) (1991), Viewpoints on geography Teaching, The Charney Manor Conference Papers, 1990, Longman Group UK, London.

Warwick, P, "How do children "see" Geographical Pictures?" in Teaching Geography, Geographical Association, Volume 12 No 3, April 1987.pp118-119

Webster, H., (1963), The Webster dictionary, John Wiley and Sons, New York.

Weeden, P., (1997) "Learning through maps" in Tilbury, D & Williams, M. (eds). Teaching and Learning Geography. Routledge, London. pp. 168 – 179.

Weeden, P., (2007) "Students' Perception of Geography: Decision making at age 14." From(http://www.geography.org.uk/Journals/Journals.asp?articleID=328).

Wilford, J.N., (1981), *The Mapmakers*. Knopf, New York.

Williams, M., (1976), Geography & The Integrated Curriculum, Heinemann Educational Books, London.

Wood, D., (1992), *The Power of Maps*, Guilford Press, New York. From the web, http://www.ilstu.edu/~jrcarter/mapuse/functions.htm

Wooldridge, S.W. & East , W.G., (1966), (Third edition revised) The Spirit & Purpose of Geography, Hutchinson University Library, London.

Websites:

http://interactive

http://interaction

http://mac.usgs.gov/isb/pubs/booklets/topo/topo.htm

http://www.ilstu.edu/~jrcarter/mapuse/functions.htm

http://archive.ncsa.uiuc.edu/SDG/Experimental/vatican.exhibit/exhibit/d-mathematics/Ptolemy_geo.html

http://www.nmm.ac.uk/cmr/coll_text/coll_charts.html

http://math.rice.edu/~lanius/pres/map/maphis.html

http://myweb.unomaha.edu/~gtesmer/historycartography.htm.

http://en.wikipedia.org/wiki/Ptolemy

http://math.rice.edu/~lanius/images/mercator.gif

http://www.henry-davis.com/maps/ancient

http://uk.encarta.msn.com

http://www.galway.ie/en/Services/Library/1842OSMaps/

the public record office of northern Ireland

http://www.cia.gov/library

http://w3sli.wcape.gov.za/surveys/Mapping/mapuse.htm

http://www.fes.uwaterloo.ca/crs/geog165/maps.htm

http://mac.usgs.gov/isb/pubs/booklets/topo/topo.htm

http://www.ilstu.edu/~jrcarter/mapuse/index.htm

http://erg.usgs.gov/isb/pubs/teachers-packets/mapshow/lesson2.html

http://www.colorado.edu/geography/gcraft/notes/cartocom/cartocom.htm

APPENDIX A

TOPIC: High School Pupils' Attitudes Towards Mapwork on the Zambian Copperbelt.

HIGH SCHOOL PUPILS' QUESTIONNAIRE

INTRODUCTION

Dear respondent,

I am a student at the University of Zambia doing a research on pupils' attitudes towards Map work in High Schools. You are kindly requested to fill in this questionnaire.

The research is purely academic and the information you provide will be strictly confidential.

Your co-operation would be highly appreciated.

1. Gender: ----------

2. Age: ----------

3. Name of school: ----------

4. Is your school? Private ( ) Government ( ) Mission ( ) Other (please specify) ----

   ---

5. Is Geography optional or compulsory in your school? Optional ( ) compulsory ( )

6. Do you like Geography? Yes ( ) No ( )

7. Do you like map work? Yes ( ) No ( ) Give reasons for your answer.

   ---

8. From your learning experience, which of the following map work areas do you find very challenging to learn: Indicate them by a cross (X)

   (1) Use of map symbols ( )

   (2) Calculation of scale ( )

   (3) Four figure grid reference ( )

   (4) Calculation of area ( )

   (5) Showing relief features using contours ( )

   (6) Calculation of gradient ( )

   (7) Six figure grid reference ( )

(8) Calculating distance on a straight line ( )

(9) Showing the relationships between human activities and the physical environment on the map ( )

(10) Calculating distance on a curved line ( )

(11) Compass bearing ( )

(12) Compass direction ( )

(13) Drawing a cross-section (profile) ( )

(14) Other (please specify) ----------

---

9. From the time you came to Grade 10 up to date, how many times have you learnt map work? Please, tick the relevant bracket below.

More than 10 times ( ) five-ten times ( ) less than five times ( ) never ( )

10. Which of the topics above in Question 8 have you covered with your teacher in class since you came to Grade 10? Just number them below.

_____

11. Please, state the most challenging topic (only one) from those indicated in question 8. Give reasons.

_____

12. Which is the easiest topic (only one)? Give reasons.

_____

_____

13. Why do you think pupils perform poorly under mapwork section in the final exam?

_____

_____

_____

14. How do you find map work? Confusing ( ) boring ( ) interesting ( ) educative ( )

Other (specify) ----------

15. Suggest ways to make mapwork useful to you after leaving school.

_____

_____

16. Would you enjoy Geography if the mapwork component was removed from the syllabus?

Yes ( ) No ( ) Give reasons for your answer:

_____

17. Does your school have a Geography club?

Yes ( ) No ( )

18. Is there enough time to deal with mapwork questions in the exam?

Yes ( ) No ( )

19. Would you be happy if the Grade 12 map work questions were an examination paper on their own? Yes ( ) No ( )

20. Do you like the way your Geography teacher teaches mapwork?

Yes ( ) No ( ) Give reasons for your answer to question 19.

_____

21. How many Geography periods do you have per week?

_____

22. Have you ever been taught mapwork outside the classroom or outside your school?

Yes ( ) No ( )

23. If you have any suggestions of how performance by pupils in mapwork can be improved, please, write them below.

_____

_____

_____

THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION.

APPENDIX B

TOPIC: High School Pupils' Attitudes Towards Mapwork on the Zambian Copperbelt.

GEOGRAPHY TEACHERS' QUESTIONNAIRE

INTRODUCTION

Dear respondent,

I am a student at the University of Zambia doing a research on pupils' attitudes towards Map work in High Schools.

The research is purely academic and the information you provide will be strictly confidential.

Your co-operation would be highly appreciated.

1. Gender: ----------

2. Age:. ----------

3. Professional qualification: ----------

4. Name of School: ----------

5. Does your school offer geography? ----------

6. If so, is it optional or compulsory? ----------

7. Years of experience in teaching mapwork in Geography: ----------

8. From your teaching experience which of the following map work areas do you find very challenging to teach: Indicate them by a cross (X)

(1)	Use of map symbols	( )
(2)	Calculation of scale	( )
(3)	Four figure grid reference	( )
(4)	Calculation of area	( )
(5)	Showing relief features using contours	( )
(6)	Calculation of gradient	( )
(7)	Six figure grid reference	( )
(8)	Calculating distance on a straight line	( )
(10)	Showing the relationships between human activities and the physical environment on the map	( )

(10) Calculating distance on a curved line ( )

(11) Compass bearing ( )

(12) Compass direction ( )

(13) Drawing a cross-section (profile) ( )

(14) Other (please specify) ----------

9. Please, state the most challenging topic to teach from those indicated in question 8 (only one).

_____

10. Would you tell why you find the mapwork topic you have indicated in question 9 challenging to teach?

_____

_____

11. In your opinion, why do you think pupils perform poorly under mapwork section in the final exam?

_____

_____

12. Have you ever taken your pupils out for field work to teach them about aspects of mapwork? If so how many times? If not why?

_____

13. Should mapwork be examined separately from paper 1 for Grade 12 classes? Give reasons.

_____

14. What challenges do pupils in your school find when dealing with map work?

_____

_____

15. What suggestions do you have on how performance by pupils in mapwork can be improved?

_____

_____

THANK YOU VERY MUCH FOR YOUR TIME AND CO-OPERATION

APPENDIX C

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

Telephone: 291381
Telegram: UNZA, LUSAKA
Telex: UNZALU ZA 44370

PO Box 32379
Lusaka, Zambia
Fax: +260-1-292702

29th January 2007

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: FIELD WORK FOR M.ED STUDENTS

The bearer of this letter Mr./~~Ms~~. KENNEDY KASIMBA computer number 526001071 is a duly registered student at the University of Zambia, School of Education.

The student is taking a Masters Programme in Education. The Programme has a fieldwork component which he/~~she~~ has to complete.

We shall greatly appreciate if the necessary assistance is rendered to him/~~her~~.

Thanking you always.

Yours sincerely

THE UNIVERSITY OF ZAMBIA
ASSISTANT DEAN (PG)
12 FEB 2007
SCHOOL OF EDUCATION
PO BOX 32379
LUSAKA

P. C. Manchishi (Dr)
ASSISTANT DEAN (PG), EDUCATION

c.c. Dean, Education
Director, DRGS

All Correspondence should be addressed
To the Provincial Education Officer
Telephone: 610353/9

In reply please quote
No.....

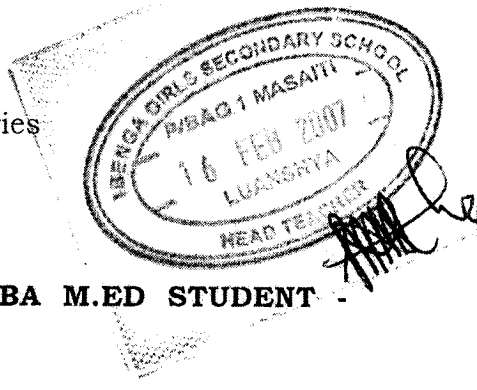
REPUBLIC OF ZAMBIA

MINISTRY OF EDUCATION

OFFICE OF THE P.E.O
P.O. Box 71552
NDOLA - ZAMBIA

14th February, 2007

To : All District Education Board Secretaries
All High School Heads
COPPERBELT PROVINCE



FIELD WORK/RESEARCH FOR MR. KASIMBA M.ED STUDENT - 526001071

Reference is made to the above subject matter.

Mr. Kasimba a Lecturer at Malcom Moffat College of Education is carrying out a research in 10 High School of the Coppperbelt Province as part of the requirement of the University of Zambia.

Please, assist him accordingly.

Thanks!

K.K. MWALE
Education Officer (TED)
For/Acting Provincial Education Officer
COPPERBELT PROVINCE

CHECKLIST.

	NAME OF SCHOOL	APPENDIX E STAMP.
	MPATAMATU High School	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION DEPUTY HEADMASTER 15 FEB 2007 MPATAMATU HIGH SCHOOL EDUCATION BOARD BOX 00 MPATAMATU LUANSHYA
	KANSENSHI HIGH SCH	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION 15 FEB 2007 DEPUTY HEADTEACHERS OFFICE KANSENSHI HIGH SCHOOL EDUCATION BOARD P.O. BOX 71824, NDOLA
	IBENGA GIRLS' SEC SCHOOL	IBENGA GIRLS SECONDARY SCHOOL P/BAG 1 MASAITI 19 FEB 2007 LUANSHYA DEPUTY HEAD TEACHER
4	MPONGWE HIGH SCHOOL	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION DEPUTY HEADS OFFICE 19 FEB 2007 MPONGWE SEC. SCHOOL P.O. BOX II MPONGWE
5.	KALULUSHI HIGH SCHOOL	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION 20 FEB 2007 DEPUTY HEADTEACHER KALULUSHI HIGH SCHOOL P.O. BOX 260122 KALULUSHI

	NAME OF SCHOOL	SCHOOL STAMP
	KALUMBWA HIGH SCHOOL	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION HEADTEACHER'S OFFICE 20 FEB 2007 KALUMBWA HIGH SCHOOL BOARD LUANSHYA DISTRICT P.O. BOX 22550, KALULUSHI
7	KANTANSHI HIGH SCHOOL	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION DEPUTY HEADTEACHER 21 FEB 2007 KANTANSHI HIGH SCHOOL EDUCATION BOARD P.O.BOX 40639 MUFULIRA
8	CHIKOLA HIGH SCHOOL	CHIKOLA HIGH SCHOOL BOARD 22 FEB 2007 HEADTEACHER'S OFFICE P.O.BOX 11203 CHINGOLA
9.	CHILILABOMBWE HIGH SCHOOL	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION DEPUTY HEADTEACHERS OFFICE 22 FEB 2007 CHILILABOMBWE HIGH SCHOOL EDUCATION BOARD P.O.BOX 210462, CHILILABOMBWE
10	HELEN KAUNDA HIGH SCHOOL	REPUBLIC OF ZAMBIA MINISTRY OF EDUCATION D/HEAD'S OFFICE 22 FEB 2007 HELEN KAUNDA SEC. SCHOOL BOARD P. BAG [illegible] KABWE