

**THE UNIVERSITY OF ZAMBIA  
SCHOOL OF EDUCATION**

**DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND POLICY  
STUDIES**

**PERCEPTIONS OF EDUCATION ADMINISTRATORS TOWARDS THE  
TEACHING AND LEARNING OF O-LEVEL PHYSICS: A CASE OF THE  
COPPERBELT PROVINCE**

**BY**

**STEPHEN CHISHIKO**



**A DISSERTATION SUBMITTED TO THE UNIVERSITY OF ZAMBIA IN PARTIAL  
FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF THE DEGREE OF  
MASTER OF EDUCATION IN EDUCATIONAL ADMINISTRATION**

**UNIVERSITY OF ZAMBIA  
2010**

**AUTHOR'S DECLARATION**

I, Stephen Chishiko, do solemnly declare that this dissertation represents my own work,  
which has not been submitted for any Degree at this or another University.


Signed:.....  
Date:..... 23<sup>rd</sup> July 2010

" 0279891

APPROVAL

This dissertation of Stephen Chishiko is approved as fulfilling part of the requirements for the award of the Degree of Master of Education in Educational Administration by the University of Zambia.

Examiners' Signatures

Signed:.....	Date: 23rd July, 2010
Signed:  Mambembo.....	Date: 23rd July 2010
Signed:.....	Date: .....

## **COPYRIGHT**

All copyrights reserved. No part of this dissertation may be reproduced, stored in any retrieval system, transmitted in any form or by any form or by any means, electronic, recording, mechanical, photocopying or otherwise, without prior permission in writing, from the author or the University of Zambia.

**© Stephen Chishiko 2010.**

## ABSTRACT

This study investigated the perceptions of education administrators towards the teaching and learning of O-Level Physics of the Copperbelt province. The study focused on 46 high schools where O-level Physics was offered within the Copperbelt province.

A total sample was of 102 respondents selected from the ten districts of the Copperbelt province. The sample comprised 10 education standards officers from each district, head teachers and science heads of departments from 46 high schools. However, 10 education standards officers, 42 head teachers and 42 heads of science departments participated in the study as rich informants. The education standards officers though not part of the members of staff at high school level they were included in the study because they constantly check on the quality of teaching and learning of O-level Physics.

Data were collected using questionnaires, semi-structured interviews and observations. The data from questionnaires were manually analyzed. On the other hand, the data from interviews were analyzed qualitatively by coding and grouping similar themes together using constant comparative techniques. To investigate on the perceptions of education administrators towards the teaching and learning of O-level Physics, some elements such as the maintenance of Physics laboratories, procurement of O-level Physics textbooks and the sponsorship of science teachers for in-service training in Physics education were examined as to ascertain the commitment to deliver the quality teaching and learning of O- level Physics in the same high schools.

The perceptions of most school administrators who had no science background towards the teaching and learning of O- level Physics was that it was expensive, challenging to pupils and that it needed well qualified teachers of O-level Physics and trained laboratory assistants.

## DEDICATION

To Constance, the love of my life

Thanks for believing in me and inspiring me to greater things. Your love, friendship and your kind, gentle spirit make living with you each day a gift. I would not be who I am without the seeds you have sown in my life.

I spent most of the time out concentrating on the work; however, I respect you, admire you and look forward to spending the rest of our lives together.

To Shuko, my little pearl

You are not only beautiful on the outside, but you are beautiful on the inside. You have such a tender heart, filled with affection. Your existence inspires me to work hard.

To Belina, my late mother.

You inspired me throughout the time we spent together. You were kind, respectful and a pillar. You amazed me with your wisdom, insight and devotion.

I treasure the time we spent together. May your soul rest in eternal peace.

## ACKNOWLEDGEMENTS

Writing a dissertation is a bit like gathering some raw materials and through an extensive refining process, shaping them into a finely tuned, high performance machine. It takes a great team of skilled and dedicated people to see a concept and then turn it into reality.

First, I wish to acknowledge with gratitude my deep indebtedness to Prof Vasyl S. Kostyuk who graciously guided and made valuable suggestions. He built and laid a firm foundation in research practical techniques which would be of valuable use for life long.

Second, I am profoundly indebted to Mr. Henry Msango for his guidance and support in realizing the role and usefulness of an administrator. His immense contribution added value and flair to this research.

I wish also to thank Mr. John Zangi, assistant researcher, who dedicated most of his precious time with me during the collection of data, compilation and analysis of material. Special appreciations go to Mr. D. Bowasi and G. Sikambo for their encouragement and concern to persevere.

I wish to extend my gratitude to my supervisors in the Ministry of Education especially Mr. Kamutumwa Muyangwa and Mr. Johnwell H.Siwingwa (PEOs) for their professional support during my studies.

I am immensely grateful to Masaiti and Chingola District Education Board teams for their financial, moral and social support during my studies.

TABLE OF CONTENTS

Author’s Declaration .....i

Approval .....ii

Copyright ..... iii

Abstract .....iv

Dedication.....v

Acknowledgements.....vi

Table of Contents ..... vii

List of Figures .....xi

List of Tables ..... xii

List of Acronyms ..... xiii

CHAPTER ONE: INTRODUCTION

1.1 Background to the Problem .....1

1.2 Statement of the Problem.....4

1.3 Purpose of the Study .....5

1.4 Objectives of the Study.....5

1.5 Research Questions.....6

1.6 Significance of the Study .....7

1.7 Limitations of the Study .....7

1.8 Operational Definitions of Terms.....7



CHAPTER TWO: LITERATURE REVIEW

2.1 Preview .....9

2.2 The Situational Analysis of Physics Education in Zambian High Schools .....9

2.3 Importance of Teaching and Learning O-level Physics .....12

2.4 The Role of Education Administrators in Teaching and Learning O-level  
Physics In Zambian High Schools .....15

2.5 Physics Education-A Conveyor belt to National Development by 2030.....18

2.6 Policies and Reforms on Science and Technology in Relation to the  
Teaching/Learning of O-level Physics in Zambia .....22

2.7 Cultural Aspects-A Tenet of O-level Physics Education .....25

2.8 The Human Dimension-As a Huddle to the Teaching/Learning of  
O-level Physics in Zambian High Schools .....26

2.9 Summary of Literature Review .....28

CHAPTER THREE: METHODOLOGY

3.1 Preview .....29

3.2 Research Design .....29

3.3 Study Population.....30

3.4 Sample Size .....30

3.5 Sampling Procedure .....31

3.6 Data Collection Instruments .....33

3.7 Validity of Instruments .....33

3.8 Data Collection Procedure .....33

3.9 Problems/ Challenges Encountered During Data Collection.....34

3.10 Data Analysis.....34

3.11 Ethical ConcernsData Interpretation.....35

CHAPTER FOUR: RESEARCH FINDINGS

4.1 Preview .....36

4.2 Findings .....36

4.3 Respondents’ Background Information .....37

4.4 Views of Headteachers, HODs and ESOs Towards Teaching and  
Learning of O-level Physics .....38

4.5 Education Administrators’ Views Towards Decrease in Number  
Of Centres offering Physics in High Schools .....42

4.6 Views of Education Administrators About the Performance of  
O-level Physics in High Schools .....44

4.7 Support Education Administrators Render to Teaching and  
Learning of O-level Physics in High Schools.....47

CHAPTER FIVE: DISCUSSION OF FINDINGS

5.1 Preview .....50

5.2 Discussion.....50

CHAPTER SIX: CONCLUSIONS AND RECOMMENDATIONS

6.1 Preview .....60

6.2 Conclusions.....60

6.3 Recommendations.....62

6.4 Suggestions for Possible Future Research.....63

REFERENCES .....64

APPENDICES

I        Semi-Structured Interview Instrument for Standards Officers.....72

II       Focused Group Discussion Instrument for Headteachers .....77

III      Questionnaire for Science Heads of Departments .....82

IV      Checklist Schedule .....86

V        Names of selected Schools where Respondents were drawn .....88

VI      University Letter- Field Work for M.ED Students.....90

## LIST OF FIGURES

Figure	Page
1.1	Percentage of Candidates who Sat for O-level Physics Examinations and Total Number of Candidates who Sat for Grade 12 Final Examination for the Period (1987-2007) .....2
1.2	Physics Examination Results for the Year 2004-2007 .....3
1.3	O-level Physics trend (2003-2008) on the Copperbelt Province.....4
2.1	Grade 12 Who Sat for O-level Physics Examination (2000-2004).....12
3.1	Map of The Copperbelt Province of Zambia.....32

**LIST OF TABLES**

Table		Page
1.1	Number of Candidates who sat for O-level Physics Examinations: 2003-2008. (Copperbelt region of Zambia).....	3
2.1	Number of Pupils who sat for O-level Physics between (2004-2009) .....	10
2.2	Number of Graduates from UNZA Majoring in Physics Education From 1990 to 2005 .....	27

## LIST OF ACRONYMS

CDC	Curriculum Development Centre
COSETCO	Copperbelt Secondary Teachers' College
DT	Diploma in Teaching
ECZ	Examination Council of Zambia
GRZ	Government of the Republic of Zambia
HQ	Headquarters
H/T	Head Teacher
HOD	Head of Department
INSET	In-Service Education and Training
ITE	Initial Teacher Education
JETS	Junior Engineers, Technicians and Scientists
MOE	Ministry of Education
MSTVT	Ministry of Science, Technology and Vocational Training
MFNP	Ministry of Finance and National Planning
NSC	National Science Centre
PEO	Provincial Education Officer
PIP	Provincial In-Service Provider
SAARMSTE	Southern African Association for Research in Mathematics, Science and Technology Education
SMASSE	Strengthening of Mathematics and Science in Secondary School Education
SIP	School In-Service Provider
UNZA	University of Zambia
ZAME	Zambia Association for Mathematics Education
ZASE	Zambia Association for Science Education
ZESCO	Zambia Electricity Supply Cooperation

## CHAPTER ONE: INTRODUCTION

### 1.1 Background to the Problem

Physics is the most fundamental of the Natural Sciences and leading branch of knowledge which determines scientific and technological progress. “ Knowledge of this subject is vitally important for engineers, technicians, scientists, designers, pilots, doctors, meteorologists and many others” (Kostyuk, 1998: 1). Therefore, the learning of this subject helps to develop the productive ability of society. The greater number of pupils taking this subject, the more skilled and productive work force will the country have which in turn would contribute to an internationally more competitive nation. This will help to redress the balance of trade problems and advance the nation technologically.

According to Ogunniyi (1998: 1), “Among other indicators there seem to be a strong relationship between the number of scientists, engineers, technicians and science teachers etc per unit population and the level of economic development”. In the same vein, Kostyuk (2004: 85) observes, “for sustainable social-economic development of Zambia, its school system should produce more learners who are scientifically literate, who could be successfully trained as scientists and technologists”. This is so because Physics is a theoretical foundation of engineering.

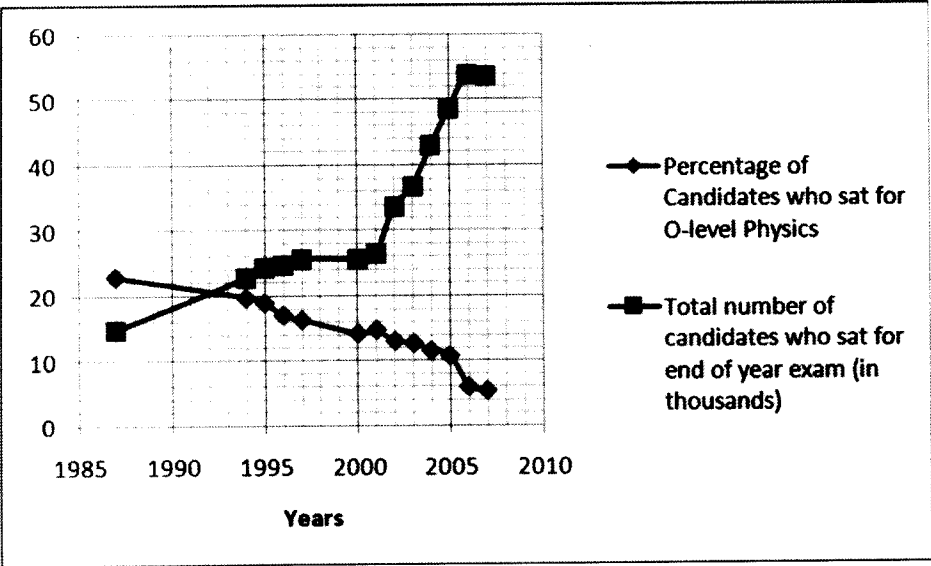
In Zambia, students learn Physics as a separate subject at senior level, that is, Grades 10, 11 and 12. It is offered as an optional subject. Physics teaching and learning in Zambia have remained a challenge, similarly to what is prevailing in other developing countries. For example the number of students who sat for O-level Physics examinations between 1987- 2007 reduced from about 22.8% to about 5.3% respectively. ECZ (2009, 67) observes that:

*Generally... the number of pupils sitting for this paper (5054/3) is reducing.*

*Therefore, I would urge the relevant authorities to encourage schools to increase on the number of pupils doing Sciences as they are our future Engineers.*

However, figure 1.1 illustrates the trends of the total number of candidates who sat for the Grade 12 final examinations versus the percentage of candidates who sat for O-level Physics.

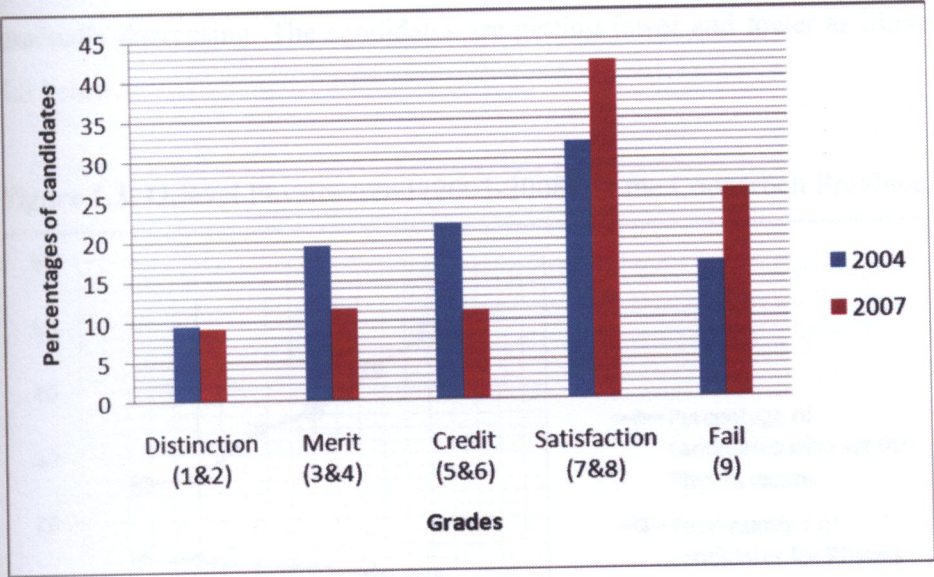
**Figure 1.1:** Percentage of Candidates who sat for O-level Physics Examinations and Total Number of Candidates who sat for Grade 12 Final Exams for the Period (1987-2007)



The second problem relates to the nature of passing. A detailed examinations results analysis shows that many of those who pass are in the credit and satisfactory range and fewer in the distinction and merit categories. Figure 1.2 illustrates the pass rate in Physics in the year 2004-2007.



Figure 1.2: Physics Examination Results for the Year 2004-2007



The national level picture of “a gradual decrease in the centres offering Physical Sciences” (Examinations Council of Zambia, 2008) is not different from what is prevailing in the Copperbelt Region. Table 1.1 shows the extract of the number of candidates who sat for O-level Physics examination between the year 2003-2008 in the Copperbelt region.

1.2.1 Status of the Physics

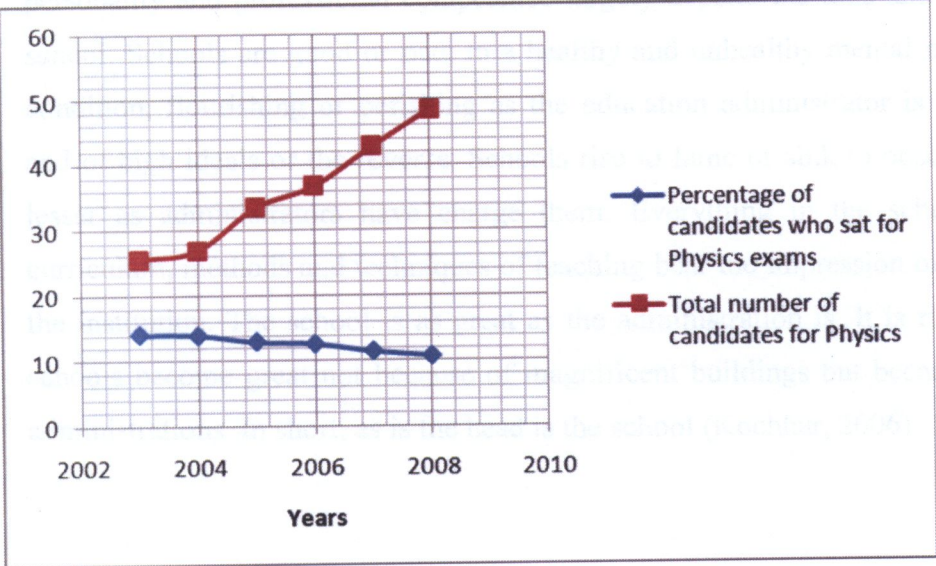
Table 1.1: Number of Candidates who sat for O-level Physics Examinations: 2003-2008. (Copperbelt region of Zambia)

Year	Total Number of Candidates	number of candidates who sat for Physics examinations	% of candidates who sat for Physics examinations
2003	25,592	3,602	14.1
2004	26,932	3,924	14.0
2005	33,476	4,322	12.9
2006	36,562	4,614	12.6
2007	42,849	4,890	11.4
2008	48,453	5,198	10.7

Source: Examinations Council of Zambia (2009)

It is evident that the number of candidates in the Copperbelt region of Zambia is gradually decreasing. The candidates are getting fewer and fewer as illustrated by figure 1.3 below.

**Figure 1.3:** O-level Physics trend (2003-2008) on the Copperbelt Province.



Source; Examination Council of Zambia (2008)

**1.2 Statement of the Problem**

O-level Physics is very important for socio-economic development of the country. But the subject is not compulsory; it is optional. In addition, performance is poor, number of centres offering O-level Physics is decreasing and the subject is stigmatized by both practitioners and non-practitioners. However, in the case of Copperbelt Province, the Perceptions of the education administrators in the teaching and learning of O-level Physics is not known. There is need to find out how they perceive the teaching and learning of O-level Physics in high schools.

### **1.3 Purpose of the Study**

The purpose of the study was to find out education administrators' perceptions towards teaching and learning of O-Level Physics in the Copperbelt province because the administrators are that major components of education on whose ability and skill, personality and professional competence largely depend the tone and efficiency of the school. Schools are good or bad, in a healthy and unhealthy mental moral and physical condition, flourishing or perishing as the education administrator is capable, energetic and of high ideals or the reverse. Schools rise to fame or sink to obscurity as greater or lesser as administrators have charge them. Everything in the school, the staff, the curriculum, methods and techniques of teaching bear the impression of the personality of the institution. The school is as great as the administration is. It is rightly said that the schools become great not because of magnificent buildings but because of magnificent administrations. In short, as is the head is the school (Kochhar, 2006).

## **1.4 Objectives of the Study**

### **1.4.1 The General Objective**

To find out the Perceptions of Educational Administrators towards the teaching and learning of O-Level Physics in the Copperbelt Province.

### **1.4.2 The Specific Objectives**

The objectives of the study were to find out:

- 1) the views of School Headteachers, Heads of Science Department and Education standards officers towards the teaching and learning of O-Level Physics.
- 2) How education administrators perceived the decrease in the number of centres offering O-level Physics.
- 3) The views of education administrators about ways which could be put in place to improve the performance O-level Physics results and
- 4) the support education administrators render towards the teaching and learning of O-Level Physics.

## **1.5 Research Questions**

The study addressed the following questions:

- 1) What views did school Headteachers, Heads of Science Department and Education standards officers hold towards teaching and learning of O-Level Physics in high schools?
- 2) What were the perceptions of education administrators to the decrease in the number of centres offering O-Level Physics?
- 3) What views did education administrators suggest to improve on the O-Level Physics performance in examination results?
- 4) What Support was rendered to improve the teaching and learning of O-Level Physics by Education Administrators in high Schools?

## CHAPTER TWO: LITERATURE REVIEW

### 2.1 Preview

This chapter reviews literature related to current study though there has been scanty literature on the Perceptions of School Administrators towards teaching and learning of O-Level Physics in High Schools in Zambia. However, we will analyse the situation of Physics Education in Zambian high schools, the importance of teaching and learning O-level Physics in Zambian high schools, the Roles of Education Administrators in teaching and learning of O-level Physics in schools, Physics Education- a conveyor belt to National Development by 2030, Policies and Reforms on Science and Technology in relation with the teaching and learning of O-level Physics in Zambia, Cultural Aspects- Tenets of O-level Physics Education and the Human Dimension- As a Hurdle to the teaching and learning of O-level Physics in Zambia high schools and then, conclude with the summary of the Literature Review.

### 2.2 The Situational Analysis of Physics Education in Zambian High Schools

In Zambia, Physics is one of the science subjects taught at senior secondary school level or high school. It is not a compulsory subject. It means that a school might not even offer it at all. According to Kostyuk (2008: 1), *“This is because, as far as science subjects at senior secondary school level are concerned, the syllabus design offered by any school is a matter of choice”*. There are two syllabus designs:

- 1) Physics can be offered as a separate subject (often called or O-level Physics) and its assessment is based on two theory examinations and one practical test or
- 2) It can be offered jointly with Chemistry (and is called Science); assessment of the combined course is based only on two theory examinations, that is, does not include a practical paper.

Physics as a subject has been taught in Zambian Secondary Schools since the country’s independence in 1964. In the early 1980s O-level Physics was taught in two years, that is, in Form IV and Form V and a number of candidates reached a few hundred students. Changes, observed Kostyuk (2008), in Physics curriculum followed in the mid-1980s and made it wider and shallower, covering three years, that is from Grades 10 to 12. As a result the number of candidates sitting for end of year examinations increased to several thousands in 1986. However, these numbers have not been significant when compared to the total number of candidates sitting for compulsory subjects such as Mathematics and English. In subsequent years *“There has been a gradual decrease in the number of pupils sitting O-level Physics”* (Examinations Council of Zambia, 2009).

**Table 2.1:** Number of Pupils who sat for O-level Physics Examinations from 2004-2009.

Year	Total Number of Grade 12 Pupils	# of Candidates for Physics Exams	% of G12 who attempted Exams
2004	25592	3602	14.1
2005	26932	3924	14.6
2006	33476	4322	12.9
2007	36562	4614	12.6
2008	42849	4890	11.4
2009	48453	5198	10.7

Source: Ministry of Education (2009)

Table 2.1 revealed that O-level Physics had not significantly changed positively in terms of pupil enrolment levels, but the percentage of pupils sitting for Physics Examinations has changed significantly.

The second problem is that the majority of candidates who passed Physics Examinations were in the credit and satisfactory categories, very few in the distinction and merit ranges as illustrated in figure 2. Poor performance of pupils in O-level Physics has persisted over years and has had a negative impact on the growth and development of the subject in Zambian Secondary Schools. There is thus already a stigma associated with the subject.



Following the policy of liberalisation, the Zambian government through the Ministry of Education has allowed some basic schools to open senior secondary classes. Consequently, statistics obtained from the Ministry of Education have revealed that the number of Grade 12 pupils sitting for school certificate examination has been increasing since 1986. Despite this, however, the number of Grade 12 pupils sitting for O-level Physics examinations has not been significantly increasing in proportion to the total number of Grade 12 pupils sitting for other subjects such as Mathematics and English.

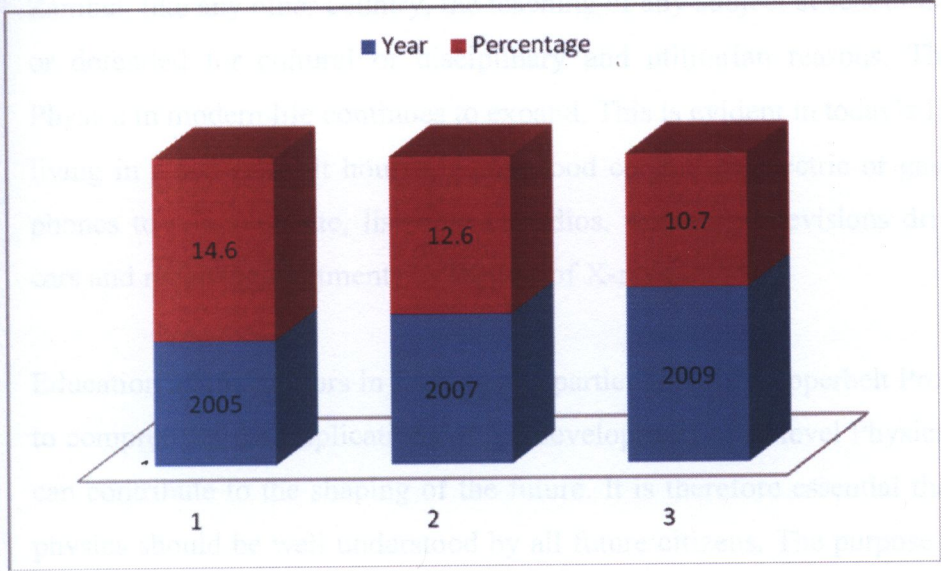
*In fact “there has been a gradual decrease in the number of centres offering O-level Physics ... most schools have opted for science (Physics/Chemistry) rather than Sciences”* (Examinations Council of Zambia, 2001).

The following observations were made by a chief examiner of O-level Physics:

- 1) There has been a gradual decrease in the number of centres offering Physics
- 2) Most schools have opted for science (Physics/Chemistry) rather than the Sciences
- 3) The trends in the performance show that there has been a general decline in the overall performance of candidates. That is, there was an increase in the failure rate in all Physical Sciences (Examinations Council of Zambia, 2000 & 2009)

Figure 2.1 shows that the number of Grade 12 pupils sitting for O-level Physics examinations has not been significantly increasing in proportion to the total number of Grade 12 pupils sitting for other subjects such as Mathematics and English (Examination Council of Zambia 2001).

**Figure 2.1:** Grade 12 who sat for Physics Examination (2005-2009)



**2.3 Importance of Teaching and learning O-Level Physics in Zambian High Schools**

Physics is the most fundamental of the natural sciences; it is one of the leading branches of knowledge, which determines scientific and technological progress. Kostyuk (2008) observes that science and technology are recognized to play crucial role in social-economic development of any country. He further points out that for sustainable social-economic development of Zambia, its school system should produce more learners who are scientifically literate, who could be successfully trained as scientists and engineers. This could be made possible if Sciences (O-Level Physics inclusive) were given a priority slot in the curriculum delivery in the Zambian schools.

Physics as a subject provides a firm foundation for many young Zambians as it seeks knowledge and understanding of the world and of life itself by a method which consists essentially of careful observation and classification of phenomena (e.g. the collapse of rocks in Mpulungu in Northern Province), of experiment (the dying of fish in Zambezi river in Western Province) and the formulation of laws which summarise our knowledge of groups of observed facts such as common floods in some parts of Zambia.



Zambia, like any other country, the teaching of any subject at school is usually advocated or defended for cultural or disciplinary and utilitarian reasons. The role of O-level Physics in modern life continues to expand. This is evident in today's lifestyle. People are living in electrically lit houses, eating food cooked on electric or gas stoves, using cell phones to communicate, listening to radios, watching televisions driving computerised cars and receiving treatments by the use of X-rays.

Education administrators in Zambia and particularly, in Copperbelt Province must be able to comprehend the implications of the development of O-level Physics in order that they can contribute to the shaping of the future. It is therefore essential that the principles of physics should be well understood by all future citizens. The purpose of O-level Physics teaching and learning in high schools should, therefore, be to introduce the students to the fundamental ideas of Physics, the viewpoint and procedure of different branches of the subject and to give pupil a feeling of its power and beauty.

Makhurane in ZASE report (1971:36) laments that;

*It is indeed a great pity that up to this day and age some of our secondary school Students still feel the way I and my contemporaries felt when we first entered Physics laboratory. Science is still viewed and sometimes also practiced as if it was full of magic or tricks, which cannot be explained simply on the basis of everyday experience*

In any case, the aim of teaching and learning O-level Physics in high schools in Zambia and indeed anywhere else should be to help the students to become scientifically minded by emphasising experiments as a way of making discoveries.

It is a firm conviction of the researcher that this study would contribute to persuade students and teachers in high schools to realize that physics is not magical or a series of tricks but about ideas which will always prevail over generations.

School administrators and other relevant stakeholders should encourage students to understand vividly that ideas which they learn in Physics laboratory would be utilised in their professional careers as engineers in the construction of bridges, invent new machines and perhaps invent new innovations which would promote long life and good

health. However, it must be appreciated that a high school student does not have to be a genius to understand the basic ideas in Physics. In any case, it is very essential that teachers should ascertain that students understand why Physics is so important in our lives. It is in this vein Till (1971: 309) suggests that,

*“Literacy in Science is essentially for every man and woman who hopes to function efficiently in our twentieth century society. It will enable the individual in a rapidly changing environment to make intelligent choices about his/her personal well-being. It will provide him/her with a basis for judging and taking action on issues related to science that affects every citizen”.*

The importance of teaching and learning of Physics in Zambian High Schools cannot be over emphasized. The high school Physics teacher has a great responsibility to ascertain that the enthusiasm of the students for physics is captured right at the beginning when the student’s curiosity about his/her environment is at its highest. Education administrators should create an enabling or conducive learning environment where pupils and teachers are provided with the right platform to interact. In this environment, the student must be encouraged to think independently to use the scientific method to make his/her own discoveries about nature.

It is in this line Rief (1985: 148) postulates that, *“Physics Education in a school has several functions to perform. It must give the student a systematic training in careful observation, in experiment and in the estimation of the relative value of results. It must provide for all pupils knowledge of the material world and of the nature, and at the same time for the small proportion of pupils who would later become scientists or those who would become technicians. It must lay a sound foundation for advanced work in the field of science and technology”.*

The knowledge of science is a unique facet and its understanding fosters man’s appreciation of nature and its characteristics. Even though a person is not personally engaged in scientific or science related occupation, he/she needs some basic understanding of scientific ideas to be able to comprehend the phenomena and the

changes in the natural world in which he/she lives (Till, 1971; Ndashye, 2007). In this case, the importance of physics education in high schools cannot be over emphasized. It is in this light and awareness that the members of the Network of African Science Academies (NASAC) addressed this statement to the meeting of Science and Technology Ministers (2006);

*We are convinced that unless national scientific and technological capacities become a central component of all nation- and continent-wide efforts to move Africa's economic development from a commodity or raw –material base to a knowledge base, the expected improvement in its economies or the quality of its peoples will be illusory.*

#### **2.4 The Role of Education Administrators in Teaching and Learning of O-level Physic in High Schools.**

The role of an administrator in relation to curriculum goes far beyond the adoption of the curriculum or its changes. The administrator must assume leadership in the continuing interpretation of the curriculum and its goes to the staff and to the public (ASCD, 1961). In this vein, the existence of Physics in a school depends on the initiative and creativity of headteacher.

The Headteacher (school administrator) has a critical responsibility of promoting subjects which seem to be unpopular but useful to the development of the nation. The Ministry of Education explains that:

*“Before everything else, the head should be an instruction leader who can enthuse teachers and pupils, who can fire them with interest and satisfaction in their teaching and learning tasks and who can establish an atmosphere that is conducive to the whole purpose of the school” (Ministry of Education, 1996:159).*

In the same line, Blum (1990) observes that an effective headteacher portrays learning as the most important reason for being in school. It is in this perspective that the perception and attitude of the headteachers towards all subjects regardless of their back ground

should be positive. For the school administrators to accomplish their role as instructional leaders, (Magagula, 1991) observes that they need to feel satisfied with their job apart from acquiring appropriate administrative, managerial and leadership knowledge.

The researcher believes that the administrator is the torchbearer of the teaching and learning process in any institution of learning. Therefore, the public looks to him/her more than anyone else for the justification of the existing curriculum, for leadership and initiative in curriculum matters. The Headteacher is responsible for determining which subject is to be introduced in the school. It is from this perspective that school headteachers, heads of science departments and education standards officers should work hand in hand to promote some stigmatized subjects such O-level Physics and Chemistry.

Although many education administrators are aware of the benefits of O-level Physics, this has not reflected in practice. Instead, O-level Physics remains essentially a least favoured subject. It is against this background that Muwanga-Zake wondered;

*Whether it was because science educators were relatively fewer or were considered unsuitable for administrative work, their absence from higher positions might imply that important policy decisions were made without professional inputs from them.*

Additionally, he observed that science teachers seemed to miss opportunities for promotions as such science educators were scarce in senior positions of directorship to the extent that non scientists managed some of the science projects in the directorate of education.

In essence, having an administrator, educator or school headteacher who had a science background would help foster more policies which would aim at raising the standards of science education (Ndashye, 2007). The role of the administrator is to eliminate those influences on curriculum which are not consistent with the principles which have been described, to resolve and take into account those that are set forth, to contribute from his own knowledge and experience and to make final curriculum recommendations. Because the administrator occupies such a critical position with respect to curriculum, he should

maintain an impartial perception towards all curriculum decisions. He must be able to distinguish between views which he/ she holds as a result of critical and sound analysis, based upon research-supported facts on one hand and opinions, theories and unverified beliefs on the other.

However, it should be noted that the administrator can influence the curriculum in another way. This is through his/her control of finances. Even after a curriculum has been agreed upon and adopted, the administrator can determine its effectiveness to some extent through his/her power to allocate funds. He can, if he/she is disposed to do so, even favour certain aspects of the curriculum as compared with others. As Maqutu (2003: 97) noted 'science education in developing countries has contended with challenges that include severe shortages of resources, most struggle to provide textbooks, laboratories, libraries and equipment for the students'. He further suggested that science education requires more specialized facilities and equipment and the consumption of items such as chemicals can be more than schools can afford. The study conducted by Maqutu (2003) also revealed that the attitude of the school heads greatly influence what goes on in the school.

Swift (1986) indicated that most heads pointed out that their schools did not have adequate facilities for science but when asked to list, in priority, the following year's development projects, putting up buildings ranked first while provision of textbooks and laboratory facilities came almost last. The researcher believes that it such type of favouritism which actually breeds distortion.

On other hand, curriculum conflicts have developed because an administrator has been unwilling to accept curriculum changes demanded by small, but perhaps powerful groups, which are in violation of the principles for curriculum changes. Though physics is considered too difficulty, administrators should work hard to make it popular, despite the expenses involved in maintaining it. Administrators who take such a courageous position, even though they may be defeated in so doing exemplify the best traditions of professional leadership. The school headteachers had a pivotal role to play in ensuring

that the measures put in place to reduce poor performance in Physics succeeded and thereby improve the situation. This would change the perception observed in the study (Ndashye, 2007) which revealed that 67% of school headteachers did not think that poor performance was their problem but that it was for the science department and the teachers of Physics in the school.

All in all, school administrators should know that they have a bigger role to play in promoting the learning and teaching of O-level Physics, to encourage the growth of the subject in high schools and to develop strategies that will assist teachers in implementing Physics activities.

## **2.5 Physics Education- A Conveyor belt to National Development by 2030**

The Zambian people's vision is to become "A Prosperous Middle Income Nation by 2030. Zambians, aspire to live in a strong and dynamic middle-income industrial nation that provides opportunities for improving the well-being of all, embodying values of socio-economic justice..." (Zambian Vision 2030, VI).

However, this can only be realized if certain tenets are put in place. First and foremost, the people of Zambia should identify the fundamental areas which could enhance the attainment of the Vision 2030. In this case, it should be noted that education acts as a strong platform on which the principles of attaining the vision 2030 anchors.

As already alluded to (by Kostyuk, 2004), for sustainable socio-economic development of Zambia, its school system should produce more learners who are scientifically literate, who could be successfully trained as scientists and technologists. It is indeed a duty of every education administrator to be aware that this onus is on them. They (school administrators) should encourage pupils to learn subjects which would be helpful to them to participate in the development of the national economy.

As noted by the Zambia Vision 2030 (2006, 27) that,

*Education is critical in enhancing a country's socio-economic development. It builds people's abilities in terms of skills and the ability to receive and process information for livelihood choices. Despite this recognition, Zambia has yet to reach educational standards that are commensurate with sustainable development.*

It is from this perspective that Physics education should be provided with the due attention it deserves; because it provides the necessary skills needed to attain the most socio-economic development sought.

The nation is in dire need of doctors, civil engineers to undertake infrastructure building and technicians. It is with this conviction that many nations which set global economic standards Zambia Vision 2030 (2006; 27) prevail;

*The provision of educational facilities remains limited and unsatisfactory due the increasing pressure on education infrastructure, poor maintenance and increase in the school going population. The poor education infrastructure could be attributed to the limited investment in education infrastructure. The poor investment education has led to high pupil-teacher ratios of about 80:1, over 10 km walking distances to the nearest school, textbook ratio of 1:7 at high school level in different subjects.*

This situation cannot enhance development in the country. Strategic stakeholders and education administrators should work hand in hand in order to change this picture. Similarly, O-level Physics, a very critical subject in producing the much needed human capital is on the verge of extinction not until the school headteachers come to the rescue of this critical subject.

Examination Council of Zambia (2009, 67) makes an accurate observation and a timely warning that, “..... the number of pupils sitting this paper is reducing. Therefore, I urge the relevant authorities to encourage schools to increase on the number of pupils doing sciences (O-level Physics and Chemistry) as they are our future Engineers.”

Ministry of Finance and National Planning (2006, 27) in Zambia Vision 2030 observes, *Regarding access to secondary education, both boys and girls have been affected adversely due to neglect of infrastructure development at secondary level of education. This has resulted over the years in high school infrastructure growing in a much slower pace than that of primary school infrastructure. Consequently, competition for secondary school places. There are presently not enough school places for pupils as only 25.9% of children completing primary school move on to high school.*

In this case, the conveyor belt to national development is disjointed in that many pupils cannot access high school education. The few pupils who manage to access high school education have been disadvantaged by avoiding learning O-level Physics due to the stigmatization of the subject and lack of commitment by the administrators.

By and large, O-level Physics is a pre-requisite to providing skills needed by technical and vocational training. This type of education is important because it contributes significantly to economic development. However, by nurturing a culture of interest in Physics, this socio-economic breakthrough could be achieved with a citizenry equipped with knowledge, skills, values and positive attitudes.

It is this sense that Michael (2005) observed that, *“only science, with Physics as its foundation can solve many of the impending crises facing our society, such as global warming, overpopulation, waning energy and other natural resources, and the poisoning of our planet. He further retaliated that “our leaders need to consult scientists in their decision making. There should be more recognition and celebration of the importance of scientific research by our business, social and political leaders. The public should seek leaders who are better versed in science”.*

The situation in science and technology in Zambia can be described as relatively underdeveloped, as measured by ‘Technology Achievement Index’. The index measures how well the country is creating and defusing technology and building up its human skills base. It includes research and development expenditures as percent of GNP, number of



scientists and engineers per million population, number of patent applications and percent of exports with high technology content to total manufacturing exports (Ministry of Finance National Planning, 2006). During the review of the past performance (2006) it was observed that Zambia had about 1000 scientists and engineers per million population engaged in research and development, which was approximately 1 scientist/engineer per 1000 Zambians. According to this review, this ratio was insignificant to make any meaningful contribution in the science and technology sector.

In any case, it should be appreciated that Physics is an enterprise, which plays a key role in the future progress of human kind. The support of Physics education in Zambia is important because:

- 1) Physics is an exciting intellectual adventure that inspires young people and expands the frontier of our knowledge about nature;
- 2) Physics generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world;
- 3) Physics contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries;
- 4) Physics is an important element in the education of chemists, engineers and computer scientists, as well as practitioners of the other physical and biomedical sciences;
- 5) Physics extends and enhances our understanding of other disciplines, such as the earth, agricultural, chemical, biological and environmental sciences, plus astrophysics and cosmology- subjects of substantial importance to all peoples of the world; and
- 6) Physics improves our quality of life by providing the basic understanding necessary for developing new instrumentation and techniques for medical applications, such as ultrasonic imaging, and laser surgery.

Hamill (1997) emphasizes that science is now accepted as an entitlement for all pupils in compulsory education. He further posed a question- why do we think science is so important?

He points out that three answers are usually given to this question but each of them can be challenged:

- Economically we are told the country needs more scientists if we are to be successful in the modern world.
- Science impacts increasingly on all of our life and so it is important that we prepare our children for a scientific world. This is undoubtedly true but can we honestly say that the science courses we have designed have been designed for this purpose? Are they designed to prepare all pupils to live in a scientific world or for the very small proportion of pupils who will become scientists?
- Science is a unique form of knowledge and through the process of scientific inquiry we enable children to bring the scientific method to the processes of problem solving, decision making and evaluation of evidence. How often however do we sacrifice the processes of science at the alter of increased content? And which of these, the processes or content, do we really value most?

However, it is observed that the way forward for science and technology in Zambia is to increase accessibility to high quality laboratory facilities; increase funding for research and development; increased high levels of commercialization of research and development results; sufficient numbers of well trained science and technology personnel; motivation for research and development personnel; significant links with the international scientific community and high accessibility to the global stock up to date scientific and technological knowledge (Ministry of Finance and National Planning, 2006).

## **2.6 Policies and Reforms on Science and Technology in Relation to the Teaching and Learning of O-level Physics in Zambia**

Science and technology programmes are implemented across all sectors of the Zambian economy. To facilitate this process, the National Science and Technology Act. No. 26 of 1997 set the legal government for implementation of the policy.

The mission of the National Science and Technology Policy is to promote and exploit science and technology as an instrument for developing an environmentally friendly indigenous technology capacity in a sustainable social- economic manner in order to improve the quality of life in Zambia. The overall policy objective with respect to research and development is to embed science and technology as part of the culture of the key economy sectors and to promote competitiveness in the production of a wide range of quality goods and services (Ministry of Finance and National Planning 2006: 141).

The aspiration of the country can not be achieved unless this vision is invested in the young. It is only through education where the school administrators are focused without any subject prejudice. It is from this perspective that Ogunniyi (1996:1) observes that, *although the link between science and technology on the one hand and economic progress on the other is rather subtle and complex, there is sufficient evidence to show that the two are inextricably related and do influence each other in a significant way.*

It should be noted that the country cannot develop beyond the intellectual capacity of its own citizens. Therefore, there is great need for school system to prepare the young Zambians to face this challenge and change the perceptions and attitudes to the teaching and learning of O-level Physics which is a pre-requisite subject of science and technology.

We should realize as adage that,

*Education is not about filling the vessel but lighting the light.*

This simply means that the task the nation is facing in this millennium is that of lighting that light within the young Zambians. We should appreciate the fact that a policy is formulated in order to address a prevailing problem or issue. The problem that existed for the past 46 years since Zambia got her independence is lack of adequate technologists, engineers and technicians who are so crucial to the economy of the country. Zambia vision 2030 (2006; 28) reveals that *challenges include lack of investment, lack of a comprehensive and integrated curricula and poor state of vocational education.*

The aspiration of the country cannot be achieved unless the policies and reforms are well articulated to address the existing gaps. For instance, knowledge of O-level Physics has obvious utilitarian value not only to the few who will utilise their knowledge in their work but to all in their everyday life. It is for this reason that we should have policies and reforms which encourage all citizens to acquire knowledge which will enable them to collectively participate in the development of the country.

The way forward for science and technology in Zambia as suggested by Ministry of Finance and National Planning (2006) is, *increase accessibility to high quality laboratory facilities; increase funding for research and development; increase high levels of commercialization of research and development results; sufficient numbers of well-trained science and technology personnel; motivation for research and development personnel; significant links with the international scientific community and high accessibility to global stock of up to date scientific and technological knowledge.*

It is for this reason that the researcher suggests that O-level Physics teaching and learning should attempt to give Zambian pupils knowledge of the outstanding discoveries on which our civilization has been based and a policy which should empower the pupils to relate these discoveries to changes in thought, social conditions and human development.

In conclusion, in the contemporary society, Science and Technology are considered to be central to creating wealth and improving the quality of life. A well-developed science and technology sector is fundamental as it allows countries to generate new scientific knowledge, to wisely select and implement existing technologies, and to effectively adapt them to local circumstances. To achieve these tasks, a critical mass of human resource base, built by science and technology concerted effort is urgently required through more investment and efficient allocation of existing resources.

## 2.7 Cultural Aspects – Tenets of O-level Physics Education

O-level Physics has important contributions to make towards the cultural development of pupils. An intelligent understanding of human society is incompatible with ignorance of Physics, since the characteristic features of modern civilization depend on man's conquest of nature by the application of scientific knowledge. O-level Physics teaching should attempt to give pupils a knowledge of the outstanding discoveries on which our civilization has been based, and must go on to relate these discoveries to changes in thought, socio conditions and man's development. The cultural value of O-level Physics depends on the way it is taught, and the teacher must not stop when she/ he considers the facts of a discovery, but proceed on to discuss the applications to real world in social set ups.

Every opportunity should be taken to correlate a topic in Physics lesson with History, Mathematics and indeed other subjects that the pupil is studying. On the other hand, Hamill (1997; 23) notes, "*culturally and as a society, we still do little more than play lip service to the value of Physics.*" He pointed out that apart from the lack of financial reward the cultural resistance to the teaching and learning of O-level Physics goes beyond that. His observation is not different from what Muwanga- Zake (2000) noted. Certain questions should be addressed especially on the part of education administrators such as; is it that O-level Physics is not accessible to the majority or is it that we have not been able to make it so?

Hamill (1997) admits the assumption that, as a subject O-level Physics is hard. There is ample evidence that high grades in science subjects are difficult to achieve. And yet overall we in the examination business find ourselves constantly having to defend improved pupil performance against the charge of lowering standards. This too is a cultural phenomenon. In our society the success of an examination is measured by the number of candidates who fail.

## 2.8 The Human Dimension – As a Hurdle to the Teaching and learning of O-level Physics in Zambian High Schools

Schools differ broadly in the way they guide pupils in the choosing of subjects. Sometimes their supervision and advice are extremely helpful and in other cases, they are detrimental. It is a fact that some schools excel more than others in the way they are run and the quality of education they offer. This is dependent upon the type of administration that is at that school. It is through a clear vision coupled with the right perception of the administrator toward all subjects that the school will excel.

It is with this view that the Chief Examiner of Physics urges the relevant authorities to encourage schools to increase on the number of pupils doing sciences as they are the future Engineers (Examination Council of Zambia, 2009) Such differences are reflected in the progress made by the students in different high schools such as high performing and low performing schools. In the high performing schools, it is usual at the beginning of the high school level to give the student a great deal of actual teaching or strong foundation.

However, it should be noted that O-level Physics has been stigmatized that very few pupils are ready to choose it for fear of performing poorly in the final examinations. Ministry of Education (1996: 54) elucidates that; *the deficiency might have been on the facilities, the resources or the teaching. It might have been blamed on the balance of the curriculum. It might be in the attitude that pupils have towards the subject, since this was known to have a major impact on student performance.*

The researcher feels duty bound to remind headteachers and science heads of departments to remember that good supervision motivates teachers of O-level Physics to provide a friendly learning environment. As Kase (2008: 129), *as a leader, your goals are to motivate people the right way, have courage to encourage your people and express your emotions.*” In this case, perceptions towards the teaching and learning of O-level Physics should be positive as to encourage both the teachers and the students in schools.

The other aspect about human dimension which impedes good teaching and learning of O-level Physics is the qualification. The study undertaken by Kostyuk (2004) revealed that there were a large number of under qualified (of three or less number of years of training) or unqualified (no formal teacher qualification). Teachers of O-level Physics who lacked both the subject knowledge and the appropriate classroom teaching skills.

In most schools there were few or no graduate teachers who were likely to do the job better. Table 2.2 clearly shows the prevailing situation of the number of Graduates at the University of Zambia in Physics Education from 1990 to 2005 as a tip of an iceberg.

**Table 2.2:** No. of Graduates from UNZA Majoring in Physics Education (1990- 2005)

Year of Graduation	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	Total
No. of Graduates	1	1	3	2	2	1	1	0	1	3	1	0	3	10	6	4	39

Source: Kostyuk (2006)

This picture is worrisome as the O-level Physics teacher at a high school has a great responsibility to ascertain that the enthusiasm of the students for Physics is captured right at the beginning. For 16 years (that is, 1990-2005), the University of Zambia managed to train only 39 teachers of Physics. By and large, it is the duty of relevant stakeholders especially headteachers, education standards officers and science heads of departments to identify teachers with keen interest to be supported adequately to train in the teaching and learning of O-level Physics at high school level.

## 2.9 Summary of Literature Review

Finally from the review of literature, it can be seen clearly that the knowledge of Physics is applied in the day to day activities and that this knowledge is pre-requisite to many careers such as engineering, technology and science research. Despite its importance, it is vivid that the subject is stigmatized and receives little attention by relevant authorities to encourage many pupils to learn the subject. The perceptions which stigmatize the subject prevail not only at low level (high school level) but also at higher levels (Colleges and Universities). In addition, this stigma has affected the performance of pupils in the final examinations at all levels, teachers who are cardinal avoid it and receive little support from school administrators on various flimsy reasons. However, the administrators in education have a greater role to play to promote the subject in schools.

Though there is a national policy in education, however, there is a great need to review curriculum so that it is relevant and responsive to today's needs of Zambia, if we are to develop from this level of economic malaise to a more prosperous economic level, specially, as the country (Zambia) embarks on a journey to become A Prosperous Middle Income by 2030. Zambia needs to equip its citizenry with the scientific skills for it to work in various fields of the economy. Moreover, Physics education provides the life skills such as critical and logical thinking are which cardinal for survival.

By and large, education administrators should be action oriented, strategic thinkers with the vision to provide desirable direction in the curriculum implementation in schools. They should be aware of their responsibilities that of shaping their schools on the long-term direction and have coherent plans for achieving desired goals. With right perceptions, they should push hard on activities that enhance pupils' satisfaction and produce a learned cadre of citizens who are to participate in the development of the country's economy.



## **CHAPTER THREE: METHODOLOGY**

### **3.1 Preview**

This chapter discusses the methods used in this study. It describes the research design, population and sample size, sampling procedure, research instruments and validity of the instruments and data collection techniques. It also discusses the problems encountered during data collection, data analysis and data interpretation.

### **3.2 Research Design**

The research design took the form of a longitudinal survey, which focused its attention on finding out the perception of education administrators towards teaching and learning of Physics in high schools; it also delved into the views of education standards officers and analyzed the perception and attitudes of heads of science departments towards teaching and learning Physics.

The survey methods were applied because it gathered data at a particular point with the intention of describing the nature of existing conditions or identifying standards against which existing conditions can be compared or determine the relations which exist between specific events (Cohen and Manion, 1997). Moreover, in the current study the survey was appropriate as it could be applied to various social problems, to collect data and interpret it. In order to obtain comprehensive results, both qualitative and quantitative research methodologies were applied.

The qualitative research methodology also was used because some research questions were open-ended. Thus the study's main objective was not so much to disprove a theory but to seek a new understanding of how education administrators perceived the teaching and learning of Physics in high Schools. Additionally, the research demanded that the field of study was in the natural setting. In this case, the study used semi-structured interviews to collect data from headteachers and Education standards officers. This

provided the study with the multiple angles of understanding the problem as an internal method of triangulation by way of validation (Kulbir, 2003; Struwig and Stead, 2001).

The study also employed quantitative research methodology in that a numerical method of describing perceptions was needed to produce quantifiable and if possible, generalisable conclusions (Best and Kahn, 1986; Kulbir, 2003). The closed questions in the self-administered questionnaire for heads of Science department, semi-structured interviews for headteachers and education standards officers and the checklist or observation schedule for Physics laboratory provided the quantitative data. Copperbelt province was specifically chosen because it had a large number of schools; that is; 31 high schools offering O-level Physics and 42 high schools not offering (O-level) Physics. The schools were found within relatively accessible distances from each other.

### **3.3 Study Population**

The targeted study population was the education administrators at high school and district levels from the Copperbelt province. The headteachers, heads of science department and education standards officers were chosen for this study because they were easier to be accessed (Cohen and Manion, 1997) in order to assess the perceptions education administrators had towards the teaching and learning of O-level Physics in high schools.

### **3.4 Sample Size**

The sample size was 102, which comprised 46 headteachers, 46 heads of science department from high schools and 10 education standards officers from districts who were selected using systematic sampling technique. The 46 schools were made up of both high and low performing schools based on Grade 12 results (ECZ/ RTD/ 2008). The 10 Education standards officers who were involved in schools monitoring (inspection) were purposively sampled. This sample was representative enough considering the nature and the purpose of this study.

### 3.5 Sampling Procedures

The study sample was selected from the study population using the purposive sampling technique. The selection of a subset to represent the entire study population was done because of the following reasons:

- It saved a lot of time, energy and money in carrying out the study; it was economical in terms of costs in that data was collected only from a fraction of the population. Sampling was also less time consuming than the census technique.
- It made the study manageable hence it was possible to collect intensive and extensive data.
- It reduced the volume of work, therefore careful execution of field work and data processing was possible (Kulbir, 2003:256).

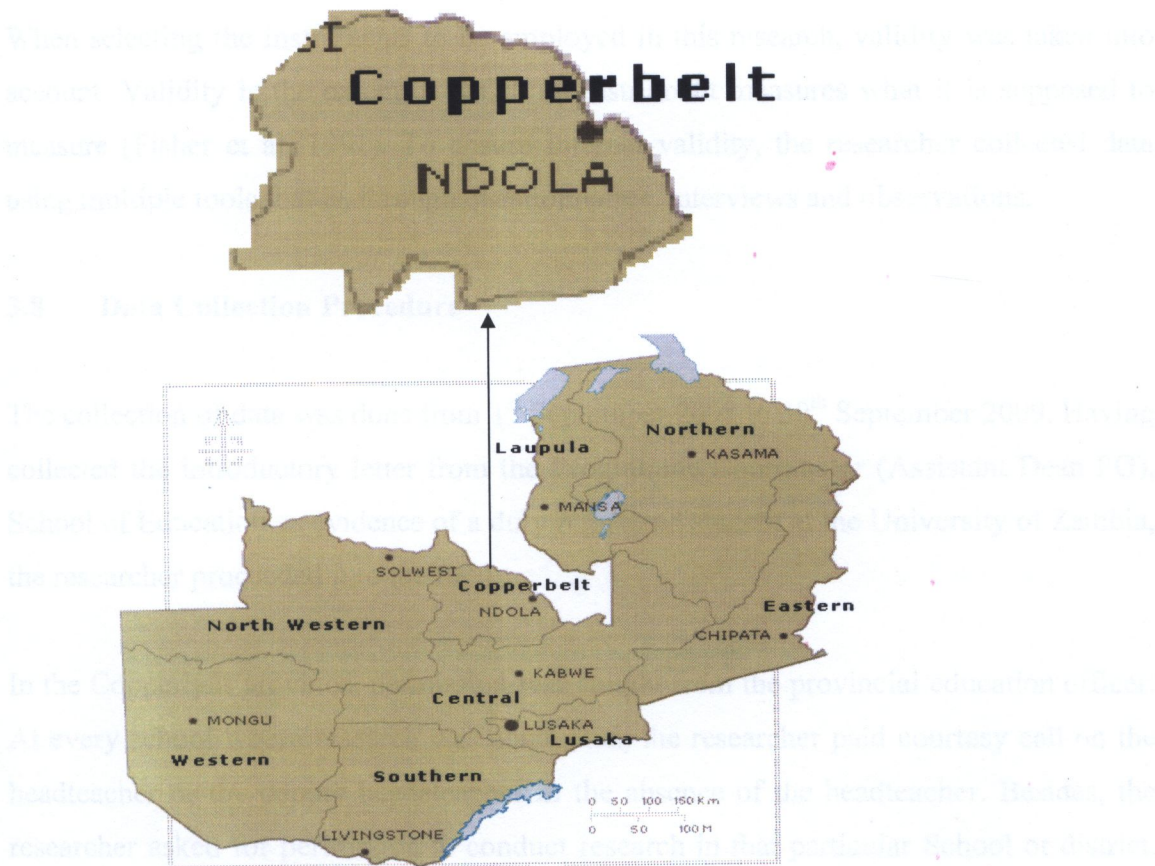
Schools were categorized into two groups, that is high performing schools and low performing schools basing on the 2008 Grade 12 Examinations Council of Zambia results. High performing schools had examination results passing rates ranging between 74% to 100% and low performing schools had the passing rates ranging from 35.5% to 49.3%. Names of the schools sampled have been kept anonymous.

The purposive sampling technique was used in selecting the headteachers, heads of science department and education standards officers in that it enabled the researcher to have complete control in selecting information rich in participants to meet the objectives of the study (Struwig and Stead, 2001; Kulbir, 2003).

3.5.1 Respondents' Geographical Location

The respondents were categorized into three groups: education standards officers, headteachers and heads of science departments. Education standards officers came from all the 10 districts on the Copperbelt Province (Chililabombwe, Chingola, Kalulushi, Kitwe, Luanshya, Lufwanyama, Masaiti, Mpongwe, Mufulira and Ndola)

Figure 3.1: Map of the Copperbelt Province of Zambia



### **3.6 Data Collection Instruments**

Data for this study was gathered through questionnaires and interview guide (see appendices I, II, III, and V). In addition to the questionnaire and interviews, observations were also conducted using the observation checklist on the availability of science laboratories and teaching and learning materials (see appendix IV), to verify the information given by the respondents.

### **3.7 Validity of Instruments**

When selecting the instruments to be employed in this research, validity was taken into account. Validity is the extent to which an instrument measures what it is supposed to measure (Fisher et al, 1991). To ensure internal validity, the researcher collected data using multiple tools that is, through questionnaires, interviews and observations.

### **3.8 Data Collection Procedure**

The collection of data was done from 1<sup>st</sup> September 2008 to 30<sup>th</sup> September 2009. Having collected the introductory letter from the Programme Coordinator (Assistant Dean PG), School of Education as evidence of a duly registered student at the University of Zambia, the researcher proceeded into the field.

In the Copperbelt province, permission was sought from the provincial education officer. At every school where research was conducted, the researcher paid courtesy call on the headteacher or the deputy headteacher in the absence of the headteacher. Besides, the researcher asked for permission to conduct research in that particular School or district. The administrators were assured confidentiality and that the study was ly for academic purposes. The following were the procedures used to obtain data:

### **3.8.1 Questionnaires**

Questionnaires were administered to 46 heads of science departments in order to collect data on their perceptions towards teaching and learning of O-level Physics.

### **3.8.2 Semi-Structured Interviews**

Interviews were conducted with headteachers using focal group discussions for 46 high schools and face to face with education standards officers from 10 districts.

### **3.8.3 Checklist for Observation**

This document was used to gather data on the availability of laboratories in 46 high schools, stocking of equipment and apparatus; and whether the materials were adequate for experiments or demonstrations.

## **3.9 Problems/ Challenges encountered during Data Collection**

The data collection was done in the third term of 2008 and part of first term of 2009. The schools in the third term were busy with final examination preparations and in the first term, high schools were engaged in sports preparations and competitions. The distance from the centres of research was another challenging factor.

## **3.10 Data Analysis**

The quantitative data collected through the questionnaire were analysed using the computer generated frequencies and percentages. In order to present statistical information, bar graphs and pie charts were also used. Interview data were analysed qualitatively by coding, emerging themes were grouped into categories using the constant comparative analysis technique. The themes and categories of the initial data were examined side by side with those in subsequent interviews. Thereafter the categories

were regrouped to generate the most significant categories and themes. The researcher also used the triangulation technique in data analysis. This allowed the researcher to test one source of data and accuracy of the findings. Different sources of data collection such as observation, questionnaires and interviews were used to facilitate triangulation.

### **3.11 Ethical Concerns**

The researcher ensured that anonymity and confidentiality of the respondents were observed and maintained. This was done by asking the respondents not to put their names on the questionnaires. Respondents were also assured that, the information obtained in the questionnaire was for academic purposes only and would not be used for any other purpose without the respondent's permission. Permission to conduct the research was obtained from the relevant authorities and no one was forced to participate in research. All the respondents participated freely.

## **CHAPTER FOUR: PRESENTATION OF FINDINGS**

### **4.1 Preview**

This chapter presents the findings of the study on the perception of Education Administrators towards the teaching and learning of O-level Physics in selected High Schools.

### **4.2 Findings**

The presentation of the findings is done according to the objectives of the study which were as follows:

- 1) the views of school headteachers, heads of science department and education standards officers towards the teaching and learning of O-Level Physics.
- 2) how education administrators perceived the decrease in the number of centres offering O-level Physics.
- 3) the views of education administrators about ways which could be put in place to improve the performance O-level Physics results and
- 4) the support education administrators render towards the teaching and learning of O-Level Physics.

Respondents in this research were drawn from 46 selected high schools in 10 districts from the Copperbelt Province of Zambia. A total of 102 respondents comprising education standards officers, headteachers and heads of science departments participated in the research.



### **4.3 Respondents' Background Information**

#### **4.3.1 Respondents' Sex**

Out of 102, 94 respondents participated in the research and 8 did not submit the questionnaires. Of the 94, 78 (83%) were male while 16 (17%) were female.

#### **4.3.2 Age of Respondents**

There were 9 (10%) respondents whose age was between 20 and 30 years; 19 (20%) participants were aged between 31 and 40; 42 (44%) participants were of the age between 41 and 50 years; and 24 (26%) participants were between the range of age between 51 and 54 years. The majority (44%) fell between the age of 41 and 50.

#### **4.3.3 Academic Qualifications of Respondents**

Of the 94 participants, 5 respondents (5.5%) were holders of master degree, 38 respondents (40%) were holders of first degree, 5 respondents (5.5%) were holders of advanced diploma and 46 respondents (49%) were holders of diploma. None of the respondents was a holder of a certificate. The majority (49%) were diploma holders, especially the heads of departments.

#### **4.3.4 Respondents' Subject(s) of Specialisation**

Of the 94 participants, 4 respondents (4.3%) were trained to teach Physics, 3 respondents (3.2%) were trained to teach Chemistry, 2 respondents (2.1%) were trained to teach Biology, 40 respondents (42.6%) were trained to teach Environmental Science and 45 respondents (47.9%) were trained to teach other subjects such as History, Home Economics and English.

#### **4.3.5 Respondents' Length of Service in Administration**

There were 43 respondents (46%) whose years of service was between 1 and 5 years, 34 participants (36%) whose age of service was between 6 and 10, 9 participants (10%) whose years of service was between 11 and 15, 4 respondents (4%) whose years of service was between 16 and 20 and 4 participants (4%) whose years of service was between the range of 21 and 25.

#### **4.4 Findings Regarding the Views of School Headteachers, Heads of Science Departments and Education Standards Officers towards the Teaching and Learning of O-level Physics in High Schools**

##### **4.4.1 Respondents' views on whether O-level Physics is the most popular subject in school.**

Of the forty-two headteachers, thirteen (30%) respondents indicated that the teaching and learning of Physics was easy compared to other subjects, twenty-one (50%) respondents indicated that the teaching and learning of Physics was slightly difficulty compared to other subjects and eight (20%) respondents indicated that the teaching and learning of Physics was very difficult compared to other subjects

On the other hand, of the forty-two heads of science departments eight (20%) respondents agreed with the statement that Physics is the most popular subject in school while the majority thirty-four (80%) respondents did not agree with the statement.

Whilst of the ten education standards officers interviewed, the majority seven (70%) participants responded that they liked monitoring Physics lessons while three (30%) participants responded that they did not like monitoring Physics lessons.

#### **4.4.2 Respondents views on whether O-level Physics concepts are easy to understand**

Of the forty-two heads of science departments, twenty-three (55%) respondents disagreed with the statement that Physics concepts are ease for pupils to understand and eighteen (43%) respondents agreed with the statement that Physics concepts are easy to understand.

Of the ten education standards officers, four (40%) participants indicated that they found Physics concepts easy to understand while six (60%) participants responded that Physics concepts were not easy to understand.

Of the forty-two heads of science departments the majority twenty-five (60%) respondent agreed with the statement that Physics was shunned in schools due to lack of quality textbooks while seventeen (40%) respondent did not agree with the statement.

Of the forty-two heads of science departments nineteen (45%) respondent agreed with the statement that pupils drop Physics due to lack of qualified teachers while twenty-three (55%) respondents disagreed with the statement.

Of the forty-two heads of science departments interviewed, the majority twenty-seven (65%) respondent agreed with the statement that Physics was taught in abstract due to lack of equipment/ apparatus in schools while fifteen (35%) respondents disagreed with the statement.

Of the forty-two heads of science departments, fifteen (35%) respondents agreed with the statement that they had a trained laboratory technician whiles the majority twenty-seven (65%) respondents stated that they lacked a laboratory technician.

#### **4.4.3 Respondents' views on whether O-level Physics is shunned in high schools due to lack of quality textbooks**

In this situation, out of forty-two headteachers who participated in the study, twenty-five (60%) headteachers agreed with the statement that O-level Physics in high school is shunned due to lack of quality textbooks. seventeen (40%) headteachers held contrary views and disagreed that lack of quality textbooks did not contribute to pupils shunning O-level Physics in high schools.

In the same vein, of the forty-two heads of science departments who participated in the study, twenty-five (60%) heads of science departments were of the similar view that lack of quality O-level Physics textbooks made pupils shun the subject.

Similarly, of the ten education standards officers who were interviewed, six participants (60%) were of the view that lack of quality O-level Physics textbooks made pupils shun the subject, though four (40%) education standards officers were of contrary views.

#### **4.4.4 Respondents' views on Whether Pupils drop O-level Physics due to Lack of Qualified Teachers of Physics**

Out of forty-two headteachers who were interviewed during the FGD, thirty-seven (88%) headteachers agreed that lack of qualified teachers in the subject contributed to the pupils dropping it. five (12%) headteachers disagreed and held contrary views.

Contrary, out of the forty-two heads of science departments, twenty- three (55%) heads of science departments had a different perception. They disagreed that lack of qualified teachers in the subject contributed to pupils dropping O-level Physics at Grade 12 level. However, nineteen (45%) heads of science departments agreed that lack of qualified Physics teachers had a contribution to pupils dropping the subject at Grade 12 level.

On the other hand, out of the ten education standards officers who were interviewed, all of them (100%) agreed that lack of qualified Physics teachers had a negative effect on the subject and contributed to pupils to drop the subject.

#### **4.4.5 Respondents' views on Whether O-level Physics is Taught in Abstract due to Lack of Equipment and Apparatus in Schools**

Of the forty-two headteachers who participated in the study, twenty-five (60%) respondents were of the view that O-level Physics was taught in abstract due to lack of equipment/apparatus in high schools. seventeen (40%) headteachers were of the contrary views.

Similarly, of the forty-two heads of science departments, twenty-seven (65%) heads of science departments were of the view that lack of equipment and apparatus in high schools contributed to teachers teaching the subject in abstract.

All the ten education standards officers who were interviewed (100%) had the view that O-level Physics was taught in abstract due to lack of equipment and apparatus in schools.

#### **4.4.6 Respondents' Views on Whether Lack of Laboratory Assistants Contributed to Teachers of Physics Failing to Conduct Experiments**

Of the forty-two headteachers who were interviewed, thirty-two (76%) headteachers agreed with this view that lack of laboratory assistants contributed to teachers failing to conduct experiments in O-level Physics while ten (24%) headteachers were of the contrary view.

of the forty-two heads of science departments who participated in the in the study, fifteen (35%) heads of science departments held the similar view that lack of laboratory assistants contributed to the failure to conduct experiments in the subject while twenty-seven (65%) heads of science departments had a contrary view. However, of the ten

education standards officers who were interviewed, eight (80%) education standards officers perceived that lack of laboratory assistants contributed to teachers failing to conduct experiments in the subject and two (20%) education standards officers held a contrary view.

#### **4.5 Findings Regarding Education Administrators' Perception Towards the Decrease in the Number of Centres Offering O-level Physics**

##### **4.5.1 Respondents' views on Whether O-level Physics Cannot be offered because there are no Qualified Teachers Physics**

Of the forty-two headteachers who were interviewed, twenty-seven (64%) headteachers were of the view that lack of qualified teachers of Physics hampered the schools from offering the subject while fifteen (36%) headteachers were of the contrary view.

In the same vein, of the forty-two heads of science departments who participated in the study, twenty-five (60%) heads of science departments agreed with the view that lack of qualified teachers contributed to centres failing to offer O-level Physics.

However, all the ten education standards officers (100%) strongly agreed that lack of qualified teachers of Physics contributed to the notion that O-level Physics could not be offered in high schools.

##### **4.5.1.1 Respondents' Views on Whether O-level Physics is Dropped by Pupils because it is very Difficult**

Of the forty-two headteachers who were interviewed, thirty-five (83%) headteachers held the view that O-level Physics was challenging or difficult, while seven (17%) headteachers held a contrary view.

Similarly, of the forty-two heads of science departments who participated in the study, twenty-eight (67%) heads of science departments were of the view that O-level Physics

was challenging though fourteen (33%) heads of science departments disagreed that O-level Physics was not difficult.

From the ten education standards officers' point of view, seven (70%) education standards officers agreed that O-level Physics was difficult whilst three (30%) education standards officers were of the contrary view.

#### **4.5.2 Respondents' views on Whether Teaching O-level Physics Requires more input than Teaching Other Subjects such as English Language and Mathematics**

Of the forty-two headteachers who were interviewed, twenty-seven (64%) headteachers agreed that teaching O-level Physics was very involving; fifteen (36%) headteachers disagreed. On the other hand, of the forty-two heads of science departments who took part in the study, eight (19%) heads of science departments agreed that O-level Physics was involving whilst thirty-four (81%) heads of science departments disagreed with the view that O-level Physics was involving.

Of the ten education standards officers interviewed, two (20%) respondents agreed with the view that teaching O-level Physics required a lot of input more than other subjects such as English and Mathematics.

#### **4.5.3 Respondents' views on Whether Offering O-level Physics in a High School is Very Expensive**

Of the forty-two headteachers who were interviewed, twenty-five (60%) headteachers held the view that offering O-level Physics in a high school was very expensive whilst seventeen (40%) headteachers held contrary views. Similarly, twenty-five heads of science departments out of the forty-two who took part in the study held the view that offering O-level Physics in a high school was expensive.

From the inspectorate point of view, all the ten education standards officers held the view that offering O-level Physics in a high school was an expensive venture.

#### **4.5.4 Respondents' Views on Whether The Performance in O-level Physics Examination is Generally Poor**

Of the forty-two headteachers who participated in FGD, thirty-five (83%) headteachers were of the view that the performance of pupils in O-level Physics was generally poor and seven (17%) headteachers did not hold that view.

In addition, of the forty-two heads of science departments who participated in the study, thirty-one (74%) heads of science departments agreed that the performance in O-level Physics was generally poor while all the ten education standards officers (100%) agreed with the view that the performance of pupils at Grade 12 level examination was generally pathetic.

#### **4.6 Findings Regarding the Views of Education Administrators About the Performance of O-level Physics in High Schools**

##### **4.6.1 Respondents' Views on Whether Pupils do not Perform well in O-level Physics Because there are no Qualified Teachers of Physics**

Of the forty-two headteachers who participated in the study, thirty (71%) headteachers agreed that the lack of the qualified teachers in the subject affect the performance of pupils in the examination while twelve (29%) headteachers held contrary views. Additionally, of the forty-two heads of science departments who took part in the study, twenty-three (55%) heads of science departments agreed that lack of qualified teachers had negative effects on the performance of the pupils in examinations at Grade 12.

all the ten education standards officers (100%) perceived that pupils did not perform well in O-level Physics examinations because there were no qualified teachers of Physics in high schools.



#### **4.6.2 Respondents' Views on Whether There are no Quality O-level Physics Textbooks in High Schools**

Of the forty-two headteachers who participated in the study, twenty-three (55%) headteachers agreed that there were no quality O-level Physics textbooks in high schools while nineteen (45%) headteachers had contrary views. In addition, of the forty-two heads of science departments who participated in the study, twenty-eight (67%) heads of science departments agreed that there were no quality O-level textbooks in high schools.

Similarly, nine (90%) out of ten, education standards officers agreed that there were quality textbooks in high schools. Only one education standards officers (10%) held a contrary view.

#### **4.6.3 Respondents' Views on Whether Teachers of O-level Physics Suffer from Low Morale due to an 'Overload' of Teaching Work.**

Of the forty-two headteachers who participated in the study, twenty-eight (67%) headteachers had the view that teachers of O-level Physics had an overload of periods hence contributing to low morale. Contrary, fourteen (33%) headteachers disagreed with that view. Besides, of the forty-two science heads of departments, twenty-five (60%) science heads of departments had the view that teachers of O-level Physics suffer from low morale due to an 'overload' of work, whilst seventeen (40%) science heads of departments had a contrary view.

In the same vein, of the ten education standards officers who participated in the study, seven (70%) education standards officers agreed that teachers of Physics suffer from low morale due to an 'overload' of work, while three (30%) education standards officers held a contrary view.

#### **4.6.4 Respondents' Views on Whether Some Teachers who Teach O-level Physics are not Science Trained Teachers**

Of the forty-two headteachers who participated in the study, twenty-two (53%) headteachers agreed that some teachers in high schools who were teaching Physics were not trained to teach O-level Physics while twenty (42%) headteachers disagreed.

Of the forty-two science heads of departments who participated in the study, twenty-three (55%) science heads of departments agreed that due to lack of trained O-level Physics teachers, the subject was taught by teachers who were not trained in science.

In addition, of the ten education standards officers who participated in the study, six (60%) education standards officers were of the view that some teachers who were teaching O-level Physics were not science trained though four (40%) education standards officers held contrary views.

#### **4.6.5 Respondents' Views on Whether There are Fewer Periods allocated to the Teaching and Learning of O-level Physics than the prescribed ones**

Of the forty-two headteachers who participated in the study, thirty (72%) headteachers agreed that fewer periods were allocated to the teaching and learning of O-level Physics on the time table whilst twelve (28%) headteachers disagreed.

In addition, of the forty-two science heads of departments who participated in the study, twenty-eight (67%) science heads of departments agreed, while fourteen (33%) science heads of departments held the contrary view.

Also, of the ten education standards officers who participated in the study, seven (70%) education standards officers held the view that fewer periods were allocated to the teaching and learning of O-level Physics on the time table than prescribed though three (30%) education standards officers disagreed with that view.

## **4.7 Findings Regarding the Support Education Administrators Render Towards the Teaching and Learning of O-level Physics in High Schools**

### **4.7.1 Respondents' Views on Whether O-level Physics Textbooks and other Related Teaching and Learning Materials are Procured every Term for the Science Department**

Of the forty-two headteachers who participated in the study, eighteen (43%) headteachers agreed that O-level Physics textbooks and related teaching and learning materials were procured every term for the department. The other twenty-four (57%) headteachers did not agree, instead, they indicated that O-level Physics textbooks and related teaching and learning materials were procured whenever funds were available in schools.

From the quantitative data, of the forty-two science heads of departments who participated in the study, twenty-five (60%) science heads of departments indicated that O-level Physics textbooks and related teaching and learning materials were procured in the third term specifically for the preparation of practical examinations. Seldom were the textbooks procured for the department.

The ten (100%) education standards officers when interviewed said their experience during school inspections was that textbooks and related materials were not procured every term by all schools. Only very few schools planned to do so especially private schools.

#### **4.7.2 Respondents' Views on Whether Teachers of O-level Physics Should be Given an 'Incentive' for the Extra Time Spent in Conducting Experiments in the Laboratory**

Of the forty-two headteachers who participated in the study as respondents, thirty (71%) respondents were of the view that teachers of O-level Physics needed support in terms of incentive for the extra time they spent in the laboratory conducting experiments. Twelve (29%) headteachers held contrary views towards giving Physics teachers incentives.

Additionally, thirty-four (81%) science heads of departments were of the view that teachers of O-level Physics needed 'an incentive' as they spent most of their extra time in the laboratory guiding pupils during experiment time. Though five (50%) of the ten education standards officers, who were interviewed suggested that teachers of Physics needed to be motivated for them to be in the laboratory during the extra time.

#### **4.7.3 Respondents Views on Whether Teachers are Sponsored to Further their Studies (Physics) under the GRZ or High School Board Sponsorship**

Of the forty-two respondents, twenty-five (60%) headteachers were of the view that teachers were sponsored either under GRZ or high school board while seventeen (40%) indicated that most of the teachers went for further studies on self-sponsorship.

Of the forty-two science heads of departments who participated in answering the questionnaires, thirty-six (86%) were of the view that teachers were sponsored by the government of the republic of Zambia to pursue for further studies though six (14%) science heads of departments claimed that the majority of the teachers sponsored themselves. Similarly, of the ten education standard officers, seven (70%) observed many teachers were given GRZ sponsorship. However, three (30%) education standard officers claimed that due to lack of funds in schools for sponsorship, many teachers went for further studies on self-sponsorship.

#### **4.7.4 Respondents' View on Whether it is Easier to Promote a Teacher of O-level Physics to a Post of Headteacher than a Teacher of English Language or Mathematics.**

Of the forty-two headteachers who participated in the study, thirty-seven (88%) were of the view that it was not easy to promote a teacher of Physics to a post of a headteacher since there were few while five (12%) headteachers suggested that there was need to do so as a way of motivation

Of the forty-two science heads of departments, there was an overwhelming suggestion by all that teachers of Physics deserved also to be promoted to the post of headteachers. On the contrary, all the ten education standard officers did not agree with this view as they suggested they needed trained teachers of Physics to be in class where they were in short supply.

#### **4.7.5 Respondents Views on Whether Headteachers Conduct Meetings with the Science Department Every Term**

Of the forty-two headteachers who participated in the study, twenty-eight (67%) agreed that headteachers conducted meetings every term while fourteen (33%) indicated that meetings were conducted whenever there was need. Twenty-five (60%) science heads of departments agreed that headteachers conducted departmental meetings termly, whilst seventeen (40%) science heads of departments claimed that only when there was need did the headteachers conduct meetings for the department.

Of the ten education standards officers who were interviewed during the study, seven (70%) education standards officers observed that they did not see any evidence in the records to show that meetings were conducted in the departments, while three (30%) indicated that in many high schools only staff meetings and sometimes management were held in schools.