RESPONSE OF ADMINISTRATORS TO POOR PERFORMANCE IN O-LEVEL PHYSICS EXAMINATIONS: THE CASE OF SELECTED HIGH SCHOOLS OF COPPERBELT PROVINCE

BY

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AUTHOR'S DECLARATION

I, MUMBA NDASHYE....., do hereby declare that this dissertation presents my own work and that it has not been previously submitted for a degree at any level, at this or any other University.

Signature: ..... Date: 6th June, 2007.

APPROVAL

This dissertation of ..... 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.

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ABSTRACT

This study aimed at investigating the response of School Administrators to poor performance in O-level Physics examinations. The study further aimed at finding out the views held by School Administrators on the high failure rate and the measures they had put in place to improve performance. The School Administrators included school Headteachers and Heads of Science Departments. The teachers of Physics were also included in the study.

A sample size of 100 subjects was used, which included 12 Headteachers, 12 Heads of Science Departments and 76 teachers of Physics from 12 selected High Schools on the Copperbelt. Only High schools which offered O-level Physics were considered and these included Mpelembe, Kitwe Boys, Helen Kaunda, Saint John's Convent, Mindolo, Saint Andrews, Kansenshi, Dominican Convent, Ndola Modern, Muzi, Ibenga Girls and Sacred Heart High Schools.

Physics Education in Zambia is one of the Science subjects which had continued to produce a high failure rate in examinations.

It was however hoped that this study would provide vital information for Policy Makers, School Administrators, teachers of Physics and other Researchers who might want to venture into this field of study.

The research methods used were fundamentally quantitative and qualitative, incorporating non participant observation, questionnaire survey and interviews.

The findings revealed that the School Administrators had the following views about the poor performance in Physics :-

- lack of support from School Headteachers;
- inadequate funding;
- low teacher morale;
- lack of Physics text books, equipment and Physics apparatus.

In an attempt to improve performance, the following measures had been put in place in the High Schools visited:

- constantly motivating pupils about the importance of Physics in Science and Technology.
- increased contact periods for Physics classes;
- in-house workshops for teachers of Physics;
- employ qualified teachers of Physics;
- twin schools with better resourced schools that are within the country or outside for support in the supply of Physics instructional materials.

The recommendations of the study included the view that School Administrators must be given an orientation or training on how to effectively administer Physics in schools; inspectorate services should be intensified in High Schools; there should be provision of equipment and Physics instructional materials needed for practicals; authorities should organize in-service training for Physics teachers who need to acquire new skills.

DEDICATION

This dissertation is dedicated to my late dearest sister, Mabel, and late brother, Simon, who passed away in August and September 2003 respectively. May their souls rest in peace.

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ACRONYMS

ECZ-------- Examinations Council of Zambia

MoE------- Ministry of Education

MSTVT---- Ministry of Science, Technology and Vocational Training

MFNP------ Ministry of Finance and National Planning

H/Ts-------- Headteachers

HODs------ Heads of Science Departments

SAARMSTE- Southern African Association for Research in Mathematics, Science and Technology Education.

SMASSE------ Strengthening of Mathematics and Science in Secondary School Education.

CHAPTER 1: INTRODUCTION

1.1 Background to the Study

Science occupies an important place in the Zambian school curriculum. At the High School level (Grades 10-12), one of the Science subjects offered is Physics. "Knowledge in this subject is vitally important for engineers, technicians, scientists, designers, pilots, doctors, meteorologists and many others" (Kostyuk,1998:1). Physics is a vitally important subject because it plays a significant role in the development of an individual. In the long run Physics contributes to the development of Science and Technology in the country.

Kostyuk (2006) further explained that:

> "In Zambia Physics is one of the Science subjects taught at senior secondary school level. It is not a compulsory subject, i.e. a school might not even offer it at all. 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) it can be offered as a separate subject (often called pure 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, i.e. does not include a practical test."

If Zambia is to focus on producing more pupils that are literate in Physics and encourage them to take up courses that are Physics oriented, the country might start making headways in the field of Science and Technology.

Ogunniyi (1998:1) explained that:

> "Among other indicators there seems 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 a country."

Kostyuk (2004) postulates that for sustainable socio-economic development in Zambia to occur, its school system should produce more learners who are scientifically literate, who could be successfully trained as scientists and engineers.

Schools see their primary role as that of attaining the maximum possible learning the pupils can achieve. There is no school system in the world which is not in one way or another concerned about a proportion of pupils who fail. Such failure is costly in terms of the efficiency of the school system. This is not to say that all failure is to be avoided or indeed that it can. We needed to know to what extent the problem might be in any school system, and we should be in a position to go some way towards controlling it. Despite this perceived role, the failure rate in O-level Physics examinations in Zambian high schools has been high.

From 1966 to 1971 the percentage of passes in science subjects at the School Certificate level in Zambia declined from 72% to 45% (Mathew, 1973:2). From 1972 up to date the pass rate in O-level Physics examinations had kept on reducing.

Physics teaching and learning in Zambia at the time of the study was marked by two major problems. The first one was the low number of pupils opting to take up Physics as

a pure subject and the second problem was the high failure rate among those who attempted O-level Physics examinations. According to Kostyuk (2004:87) the number of students who take pure Physics has reduced from about 23% in 1986 to about 16% in 1997. He has shown that less than 30% of the secondary schools were offering pure Physics in 2001. The situation had not changed significantly up to the time of the study. The second problem was related to the nature of passing. Kostyuk (ibid) also pointed out that the majority of the candidates who passed Physics examinations were in credit and satisfactory range and fewer in the distinction and merit categories. Similar findings were reported by the Examinations Council of Zambia (ECZ: 2004) presented in table one.

Table 1:- E.C.Z Physics Examination Results for 2004

Pass Grades	Distinction 1 and 2	Merit 3and 4	Credit 5 and 6	Satisfactory 7 and 8	Fail 9
Percentage of Candidates (%)	9.4	19.4	22.0	32.1	17.1

Source: Examinations Council of Zambia (2004).

Despite being introduced as early as the 1960s in the Zambian curriculum, Physics as a subject has not developed the way other subjects introduced at the same time have. Information from the Examinations Council of Zambia (2004) shows that the majority of candidates sitting for Physics Examinations in Zambia had been obtaining a pass grade of 5 or higher. The information from ECZ (ibid) further showed that less than 30% of the candidates obtained a pass grade of 4 or better. Physics examination results obtained from ECZ for the past 10 years showed a similar scenario as depicted by the 2004 results.

The Ministry of Education (MoE) in the 1996 National Policy document, "Educating Our Future", mentioned that:

> " This distressing picture of poor performance in Science reflects deficiencies at the school level. The document identifies the possible deficiency as being in the facilities, the resources or the teaching. It might be in the expectations that pupils set for themselves and that others entertain for them, since these are known to have a major impact on the pupil's performance." (MoE; 1996:53)

Over the past 35 years, the MoE had recognised the problem of poor performance in 'O' level Physics examinations. As a result of this the development of Science subjects had been mentioned in the Policy Documents on Education which had been produced in the past years, including the Policy Document, Educating Our Future of 1996 where it said that the Ministry of Education should aim at concentrating efforts on improving pupils' achievements in Science subjects (MoE, 1996:54). In view of this, schools should concentrate efforts on effecting significant improvements in Physics so as to address the underachievement in the examinations.

1.2 Statement of the Problem

Pure Physics is not a compulsory subject in Zambian schools. School Administrators might decide what cohort of pupils to take the subject. In spite of this measure the performance of pupils is not impressive. Most schools of the Copperbelt have had one major problem of high failure rate which has persisted for the past 20 years. Most schools recorded less than 30% pass rate of a grade 4 (merit or better), (E.C.Z, 2004).

However, it is not known how School Administrators were responding to the under achievement of pupils in O-level Physics examinations. It is also not known if they have put in place any measures to improve the performance of pupils and encourage more pupils take up Physics as a subject.

1.3 Purpose of the Study

The purpose of the study was to find out how School Administrators of selected High Schools on the Copperbelt province were responding to poor performance of pupils in Physics. The study further aimed to find out views held by School Administrators and teachers of Physics on underachievement and establish the possible measures which could be employed to reduce the high failure rate in Physics examinations.

1.4 Objectives of the Study

(a) The general objective:

To find out the responses of School Headteachers, Heads of Science Departments and teachers of Physics from selected high schools on the Copperbelt to the high failure rate in O-level Physics examinations.

(b) The specific objectives:

(i) to identify factors which contributed to the high failure rate in pure Physics.

(ii) to establish the views held by School Headteachers, Heads of Science Department and teachers of Physics on the poor performance in 'O' level Physics.

(iii) to identify the possible measures which should be put in place by Headteachers, Heads of Science Departments and teachers of Physics in order to improve performance in Physics.

1.5 Research Questions

The study addressed the following questions:

(i) What were the factors contributing to the poor performance of pupils in pure Physics examinations?

(ii) What were the views held by School Headteachers, Heads of Science Departments and teachers of Physics on the poor performance in pure Physics?

(iii) What were the views of School Headteachers, Heads of Science Departments and teachers of Physics about possible measures to improve performance in 'O' level Physics?

1.6 Significance of the Study

Although various researchers and commentators had indicated the possible causes of the underachievement in pure Physics examinations, no study had been conducted to determine the measures which Zambian School Administrators had put in place as a response to underachievement in O- level Physics examinations.

It was hoped that the findings of the study might help Policy Makers and the School Administrators to address this problem of underachievement.

1.7 Limitations of the Study

There were a number of factors that restricted the scope and breath of this study. These include:

- the one to one interview method with Headteachers and Heads of Science Departments was found to be limiting since as is known, matters of accuracy and honesty on the part of the administrator could not be guaranteed.

- limited time prevented the researcher from involving certain schools.

- matters of financial constraints were also unavoidable. This is because coming up with generalizable findings needed a larger sample, which this study was not able to have due to limitations in financial resources.

1.8 Definition of Terms

The following were the definitions of terms used in this study:

Administration- the art of looking after people's welfare using routine bureaucratic and other methods.

Apparatus- items and instruments used during practical lessons.

Attitude- a settled mode of thinking portrayed by a person that has an effect on what that person is doing. Attitude can be positive or negative depending on the situation.

Effective- the activity being performed well that is to do with high expectations

Failure rate- the ratio of the number of pupils who have failed the examination against the total number of pupils who sat for the examinations.

Head of Science Department- an experienced and knowledgeable teacher of a science subject that is Physics, Chemistry or Biology, who is appointed to supervise others and control the affairs of running the department. His/Her main responsibilities are to supervise the proper teaching of science subjects, to acquire materials and apparatus for practical lessons and to control the use and maintenance of materials and apparatus.

Management- the art of planning, organising, supervising and evaluating school activities so that the aim of teaching can be met.

Pass rate- the ratio of pupils who passed the examination against the total number of pupils who sat for the examination.

Policy- the statement of intention directed at solving problems in order to achieve or attain desired goals.

Responses- the measures School Administrators and teachers of Physics have put in place in order to minimise the poor performance in Physics examinations.

School Administrators- headteachers and heads of Science departments in charge of the running of Physics Education in High Schools.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

There was very little and scanty literature on Headteachers, Heads of Science Departments and teachers of Physics' responses to the poor performance in 'O' level Physics examinations. As a result of that the literature review only covered the following areas: the origins and growth of Physics Education in Zambia, the role of Physics Education in Zambia and a review of the government's policy on Physics Education and finally a review of some contextually related literature on the causes of the underachievement in Physics examinations. The responses School Administrators have put in place to improve the performance in Physics examinations would be in the areas of teacher development, procurement of teaching aids/ materials and attitude change by Headteachers, Heads of Science Departments, teachers of Physics and pupils towards Physics as a subject in schools. The term 'Physics Education' would be used interchangeably with the term 'Science Education', therefore literature on 'Science Education' would also refer to 'Physics Education.'

2.2 Physics Education in Zambia

2.2.1 Origins and Growth of Physics Education in Zambia

Physics as a subject has been taught in Zambian schools as early as the 1960s where it was taught combined with Chemistry as Physical Science. Mwanakatwe (1973:69) explained that every pupil in Zambian secondary schools was required to take a practical subject such as Technical Drawing in addition to core subjects of the curriculum which included English, Mathematics, Geography, Civics, Physical Science, and Religious Knowledge, a Zambian language or French. Since independence Physics has continued

to be taught in Zambian schools either as pure Physics or Physical Science which is a combination of Physics and Chemistry. Until the early 1980s 'O' level Physics was taught in two years that is in Form IV up to Form V and the number of candidates was only a few hundreds. The syllabus was found to be bulky making it difficult to be covered in two years. A study conducted by Mathew (1973) recommended that there be changes in the 'O' level Physics curricula so as to make broader and relevant to the Zambian environment. Following this recommendation the pure Physics curricula was made wider and shallower covering three years from Grade 10 to Grade 12. The changes in the pure Physics curricula led to a considerable increase in the number of candidates. Despite the changes made to the Physics curricula and the increase in the number of candidates to several thousands, the underachievement in 'O' level Physics examinations among these candidates has continued. For over 20 years Physics examination results had been marked with a high failure rate. This poor performance had persisted and it had a negative impact on the growth and development of the subject in Zambian high schools. Statistics obtained from the Ministry of Education (MoE) revealed that from 1986 to 2005, the number of Grade 12 pupils seating for end of year examinations had been increasing. Contrary to this increase, the number of Grade 12 pupils sitting for 'O' level Physics examinations had not been significantly increasing in proportion to the total number of Grade 12 pupils sitting for other subjects such as Mathematics and English. Table 2 shows the number of Candidates that had attempted 'O' level Physics examinations since 1986 to 2005:

Table 2: Number of Candidates who sat for O-Level Physics Examinations Between 1986-2005

YEAR	TOTAL NUMBER OF CANDIDATES	NUMBER OF CANDIDATES FOR PHYSICS EXAMINATIONS	PERCENTAGE OF CANDIDATES WHO SAT FOR PHYSICS EXAMINATIONS (%)
1986	12468	2714	21.8
1987	14655	3347	22.8
1988	15974	3180	19.9
1989	17003	3348	19.7
1994	22699	4475	19.7
1995	24332	4596	18.9
1996	24639	4168	16.9
1997	25574	4137	16.2
2000	25592	3602	14.1
2001	26932	3924	14.6
2002	33476	4322	12.9
2003	36562	4614	12.6
2004	42849	4890	11.4
2005	48453	5198	10.7

Source: Ministry of Education, Zambia (2005).

Table two revealed that O-level Physics had not significantly grown in terms of the number of enrolled pupils and those that finally wrote the pure Physics examinations. Although Zambia in 1983 commenced preparing local examinations for schools the high failure rate in Physics examinations has persisted. In an attempt to improve the performance of pupils the Ministry of Education (MoE) through the Curriculum Development Center in 2000 introduced a revised syllabus for O-level Physics but the situation appears to have remained unchanged.

2.2.2 The Role of Physics Education in Zambia

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, 2006). Physics is recognized as an important subject in the development of mankind. It is the theoretical foundation of engineering, (Kostyuk, 2004). Till (1971:309) postulates that in today's world mankind's reliance on Science and Technology is immeasurable. "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 teaching of Physics as a subject in Zambian schools can be defended for cultural, disciplinary and utilitarian reasons. According to Rief (1985:148) "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 forces

of nature, and at the same time for the small proportion of pupils who would later become scientists or those who would become technicians. Physics Education must lay a sound foundation for more advanced work in the field of Science and Technology."

The knowledge of Science and Physics is a unique facet and its understanding fosters man's appreciation of nature and its characteristics (Till; 1971:309). Even though a person is not personally engaged in a 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. The role of Physics in schools cannot be over emphasized. Guindiza (1983:112) explained the importance of Science in the economic development of a country because with proper government-scientist cooperation the significant economic development can be achieved in most countries.

2.2.3 Policy on Physics Education in Zambia

The National policy document on education, Educating our Future, (MoE, 1996) discusses Physics Education inclusively with Biology and Chemistry Education and the three are referred to as "Science Education". As a result there appeared to be no (clear) policy on Physics Education in Zambia.

With regard to Science Education, the Ministry of Education (MoE, 1977:29) stated that "today we live in a scientific and technological era; more and more importance should be attached to the ability to apply the achievements of Science and Technology to one's work in confronting the developmental problems of the country." Thus, the problems the country faced in matters of providing a balanced diet, development of mineral resources,

water supply, health and sanitation, modern scientific farming and combating livestock diseases cannot be solved without calling for scientific and technological dexterity. Therefore Mathematics, Science and Technology had to play a vital role in the new curricula, so that education could increasingly and most effectively be responsive to some of the major needs of the country.

The MoE as early as 1977 realized the importance of teaching and learning Science in schools for development. It was further mentioned that since Mathematics, Science and Technology played a vital role in the development of the country, more importance would have to be given to these by curriculum designers without sacrificing the importance of other subjects.

The Ministry of Science, Technology and Vocational Training (MSTVT, 1994:1), in support of MoE's policy on High School Education stated that Science and Technology have an important role in the economic and industrial development of any nation.

Despite the policy declaration of 1977 the standards of Science Education and specifically Physics Education had been deteriorating.

A study conducted in Zambian secondary school by Mathew (1973:2) observed that from 1966 to 1971 the pass rate in all Science subjects at Certificate level in Zambia declined from 72% to 45%.

In view of the falling quality in Science Education in Zambian schools, MoE (1996:59) reiterated government's policy for high school education and stated that the goal of High School Education was to enable every pupil become a well-educated person who would be useful to society and who would be adequately prepared for the furtherance of his/her education or for becoming a self-supporting worker.

The MoE (1996:59) in acknowledgement of the falling standards in Science Education mentioned that one further aspect of the current high school performance was far from satisfactory, especially in the key areas of Mathematics and Science. This came out strongly in examination results. On average, less than two-thirds of the candidates obtained a full pass in school certificate each year. It was all the more unsatisfactory when it was recalled that these students were the peak of their cohort who were successful in rigorous selection examinations at the end of Grade 7 and 9.

The overall unsatisfactory performance in school certificate was attributed in large measure to poor performance in Mathematics and Science. The policy document of 1996 further explained that this distressing picture of poor in-school performance in Mathematics and Science and subsequent inadequacy in these areas points to deficiencies at school level.

> "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. There was a situation which required urgent attention and major interventions. The pupils themselves and the country as a whole could not sustain a continuation of these unsatisfactory performances in Mathematics and Science, leading to equally unsatisfactory performance in the school certificate as a whole and subsequent impairment of national potential for technological development." (MoE, 1996:54).

On improving Mathematics and Science, MoE (1996) explained that the majority of schools would continue to offer the current general academic programmes. In accordance with the concerns that had been expressed about Mathematics and Science, schools offering a general academic education would concentrate their efforts on effecting significant improvements in these subjects. Moreover, some among them would be identified to specialize more explicitly in Mathematics and the Sciences, in order to augment the output of trainable individuals needed by higher education and industry so that they could serve as centers of excellence that might help to raise the quality of Mathematics and Science Education in other schools.

The Ministry of Finance and National Planning (MFNP, 2002:179) stated that the foundation for the development of Science and Technology depended on the products from high schools. The Educational system needed to provide a firm Science foundation in all schools which had not been possible because over the past decade, many schools had suffered staff shortages for science subjects because of staff attrition and the failure by most university trained Science-Education graduates to take up positions in the teaching profession in preference for positions in industry and elsewhere.

In summary, it has been discovered that the policies mentioned had been very sketchy; they had not clearly spelled out the needs and weaknesses of specific major science subjects which were Biology, Chemistry and Physics.

Until the time of the study the policies still handled Biology, Chemistry and Physics collectively and had generally been referred to as science subjects. The three subjects needed to be handled separately during policy formulation if any significant improvement was to be noted in Physics Education.

2.2.4 Related Studies on the Underachievement in Physics Examinations

It had been very difficult to find literature which specifically addressed the area of the measures School Headteachers had put in place in response to the poor performance in Physics examinations.

The Headteacher has a major responsibility of promoting excellence in a school. School Administration affects both teacher and student achievement. The Ministry of Education explains that:

> "Before everything else, the head should be an instructional 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." (MoE,1996:159)

Blum (1990) explained that effective Headteachers portray learning as the most important reason for being in school. The Headteacher encourages excellence in students and teacher performance highlighting the importance of excellence

The role that School Administrators have in improving performance of pupils can not be over emphasized because as school managers they were expected to be concerned about the high failure rate. The Headteacher is the visionary of the school and as such he/she plays a critical role in the quest to improve the performance of pupils in Physics examinations.

Headteachers are charged with the task of maintaining a school environment conducive to learning (Balderson, 1975). In order to accomplish that task they needed not only acquire appropriate administrative, managerial and leadership knowledge, skills and attitudes, but also feel satisfied with their job (Magagula, 1991). He further continued

that as chief executives of schools, Headteachers were often called upon to make demands or issue orders to staff members. For that reason this research is focused on the Headteachers and on how they had guided their members of staff on the high failure rate in Physics examinations.

Studies conducted in Zambia (Mathew,1973, Shanyinde,2001,Haambokoma, et al,2002 and Kostyuk, 2004,2006) had focused mostly on the causes of the poor performance in Physics examinations. These studies are presented in the following paragraphs.

According to Mathew (1973:1) from 1966 to 1971 the percentage of passes in all Science subjects at school certificate level in Zambia declined from 72% to 45%. He also argued that the causes of the decline in the pass rate at the time of the study related to students and learning and the causes included: lack of intelligence, lack of linguistic ability, lack of motivation, indiscipline, inappropriate learning techniques and other causes, like ill health. He further explained that the causes relating to teachers and teaching included: linguistic difficulties, inappropriate teaching techniques and discontinuity in teaching. The causes relating to curricula and examinations included:

(a) the Cambridge syllabuses which seemed to be too difficult to interpret;

(b) the supporting curricula and the Cambridge examinations which appeared to be too difficult for Zambian pupils to understand;

(c) finally the causes relating to resources and organization included: lack of material resources, ineffective Heads of Science Department, poorly trained teachers, and lack of inspection.

When the study (Mathew,1973) was conducted, the major recommendation was that Zambia should establish a council responsible for preparing local examinations suited for the local environment instead of examinations prepared in Cambridge.

Although Zambia in 1983 did commence preparing local examinations for schools but the high failure rate in Physics examinations persisted.

According to the Ministry of Education (MoE, 1996) the difficulties of many pupils with Mathematics and Science go back to the way they were introduced to these areas in primary school. Therefore, a long term solution to the problem must be suitable interventions at the basic and teacher training levels. In the shorter term, however, it was still possible for the schools to provide considerable remediation and establish an adequate foundation for high school work in Mathematics and Science. To accomplish this, qualified teachers needed to work with pupils from Grade 8 onwards. It was too late to try to lay in Grade 10 a foundation that should have been in place much earlier. These factors point to the need to strengthen the teaching of Mathematics and Science at the upper basic level. It also highlights the importance, noted above, of providing remedial teaching in these areas at the commencement of Grade 8 (ibid: 54).

The study by Kostyuk (2004) revealed that in 2001 there were a large number of under-qualified (of three or less number of years training) or unqualified (no formal teacher qualification) teachers of 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. The study revealed that due to shortages of teachers of Physics, those trained in Teachers Training Colleges found their way into High schools. Most teachers of Physics were young (57.8% under 30 years) and

inexperienced (48.6% have experience less than 5 years), experienced teachers tended not to continue teaching (only 9.5% of teachers had experience 15+years).

Over the past 16 years the University of Zambia, School of Education had produced less than 7 teachers of Physics every year.

Table 3 presents the number of graduates with Bachelor of Science with Education and Bachelor of Education in Mathematics and Science from the University of Zambia majoring in Physics Education from 1990 to the year 2005.

Table 3: Number of Graduates from UNZA Majoring in Physics Education From 1990 to 2005

Year of Graduation	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	TOTAL
Number of Graduates	1	1	3	2	2	1	1	0	1	3	1	0	3	10	6	4	39

Source: Kostyuk (2006)

Table 3 shows that for a period of 16 years the school of education has produced only 39 graduate teachers majoring in Physics Education. This number is too low to carter for over 370 high schools in the country, (MoE,2002).

In support of Kostyuk's findings, a situational analysis from MoE (2002:37) explained that in the past teachers at High School levels were supplied by a number of colleges in addition to the University of Zambia (UNZA). In 2005, High School teachers were supplied by UNZA and Advanced Diploma holders from Nkrumah, Chalimbana and Copperbelt colleges who might teach Grade 10-12 classes.

Kostyuk (2004) further revealed that in terms of academic credentials only 20.2% of teachers were qualified to teach Physics. There is thus a vicious circle: unqualified teachers cannot motivate pupils, with the result that after finishing secondary school these pupils are scared to join the School of Education, University of Zambia (UNZA), to be trained as teachers of Physics. As a result UNZA has "tended to produce very few teacher, particularly in Physics Education, where for many years not more than three teachers graduated each academic year" (Haambokoma et al, 2002:19).

By 2006 funding from the Central Government was unreliable, irregular and inadequate, and most High Schools relied on community support through fees and other fund-raising methods. Thus resources to maintain the quality of High School education had been extremely limited in recent years.

In a study by Shanyinde (2001) on the teaching and learning of Science in Zambian schools, it was revealed that the problems were in three main categories which included: problems of teaching and learning , state of facilities and teaching-learning methods commonly used. The findings of the study showed that the problems of teaching and learning Science included insufficient time to complete the syllabus, insufficient support from the National Curriculum Center. The study further revealed that inspectorate and management, pre-service training did not meet the demands of the Science curriculum and the work load was too much and so could not have remedial classes. Teachers were too ill-equipped to handle mixed ability classes, poor pupils' reading skills and therefore heavily dependent on teachers. Teachers lacked motivation in the teaching profession. The study further revealed that there were insufficient equipment and materials,

insufficient classroom space, few teaching models and white boards. The study further showed that the teaching and learning methods commonly used were exposition, chalk and talk. Demonstrations, practicals and projects were teaching methods which were not commonly used in schools. The study also revealed that the most commonly used teaching method was the lecture and over reliance on teaching notes and textbooks.

In support of Shanyinde's findings, the Ministry of Finance and National Planning (MFNP, 2002:179) stated that the laboratories in schools were not well equipped. They lacked the necessary tools and chemicals for practical lessons. As a result, many school leavers especially those from public schools had very little exposure to practical and Science lessons.

Ogunniyi (1996:278) noted that no education system can be higher than the level of education of the teacher. Thus standards in Science classrooms might fall because of the shortage of properly trained Science teachers.

A study conducted in South Africa by Paras (2001:66) observed that South Africa was confronted with a Science teacher crisis not only in terms of numbers but also in terms of the quality of teachers. Poorly qualified teachers produced poorly qualified pupils, some of whom went on to become poorly qualified teachers.

Maqutu (2003:97) revealed that Science Education in developing countries has contended with challenges that include severe shortages of resources, most struggle to provide text books, laboratories, libraries and equipment for the students. The study

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 further revealed that lack of qualified and committed teachers had a negative impact on pupils' achievement.

The study by Muwanga-Zake (2000) outlined some problems in the Science classrooms and some possible reasons why the teaching of Science was unpopular. This included poorly qualified teachers and deficiencies in practical skills as well as poor conceptual understanding which were passed on from teacher to learner who then became a teacher from one generation to the next. This cycle perpetuated incompetence and led to the deterioration of standards over time.

The study's findings further revealed that Science teachers seemed to miss opportunities for promotion such that Science Educators were scarce in senior positions such as in the directorship, to the extent that non-scientists managed some of the Science projects in the Directorate of Education. In this study Muwanga-Zake (2000) noted that;

> "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 science educators."

The study suggested that 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.

The problem of poor performance in 'O' level Physics is not only found in Zambia and Africa but in other parts of the world as well. In a study conducted by MacDonald & Rogan (1988) argued that some school environments de-motivated learning. School environments that could be de-motivating included poor physical structures such as dilapidated buildings, environments devoid of examples of 'School Science' and lack of facilities such as Science equipment, laboratories and libraries.

The study conducted by Wessel (2004) outlined that Science Education is a complex process which in its simplest form involved at least teacher instruction, student learning and a Science Curriculum. Students should not be viewed as empty vessels or blank slates that could be filled by lecturing about Science, rather they must be actively involved in their learning (Miller & Driver, 1987). The traditional instructional strategy of teaching by providing definitions of concepts and statements of principles were not sufficient enough for learners to perform complex intellectual tasks required to learn in Science. The pupils have to be involved actively in the process of learning by doing a lot of practicals. This study concluded that the teacher is an integral part of the process of learning Science in classrooms, and is responsible for implementing strategies that facilitate learning by students.

A study conducted by Belcher (2003) suggested some recommendations for schools that were aimed at improving their students' Science achievements. The recommendations included the following;

(a) review of the curriculum each year to get teachers to look at the standard for prerequisite and subsequent classes,

(b) review the course often to make sure the students are being taught to high standards,

(c) identify problem areas by reviewing passing and retention rates,

(d) introduce student assignments and laboratories that incorporate engaging,

(e) real world learning experiences to help students meet standards at the basic and proficient levels and finally,

(f) have students work towards a Science project that cuts across more classes or grade levels.

The study further stated that the problems, which resulted in high attrition and failure rates among students, have been found in both High School and undergraduate Physics courses in Britain. The lack of a common language between Mathematicians and Physicists was cited as the root of learning difficulties experienced by Physics students.

In conclusion it should be mentioned that, although the studies reviewed did not talk about the measures Headteachers and Heads of Science Departments had put in place in response to the high failure rates in 'O' level Physics examinations, problems in Physics Education were not only found in Zambia but also in other developing and developed countries, including South Africa, Lesotho, Kenya and England respectively. The factors identified from the study conducted by Belcher (2003) were among those that were required to adequately teach and learn Physics in High Schools. There was an urgent need for the High Schools on the Copperbelt to put their planned actions into practice. The current study therefore, was designed to examine the responses that High School Administrators had put in place and see how these responses could be used to improve the performance of pupils in Physics examinations using the expertise of a trained

teacher of Physics. Furthermore the literature reviewed in this study included the possible causes to the problems in Physics and Science Education. The suggested solutions and measures which might be used as a response to these problems had also been reviewed. Some notable measures that were identified from the literature review were broadening the teacher training curriculum which should include short training courses aimed at sensitizing School Headteachers and Heads of Science Departments who manage departments and schools which offer Physics as a subject.

CHAPTER 3: METHODOLOGY

3.1 Preview

In this chapter, descriptions of the techniques that were used to collect, analyze and interpret data are presented. These include research design, study population, sample size, research instruments, data collection and data analysis techniques.

3.2 Research Design

A survey was used in this study. The survey design is the most suitable way of addressing the questions because of the type of data required from a known population. A survey technique was used because the data obtained can be generalized within given parameters.

Mouly (1963:231) explained surveys as being oriented towards the determination of the status of a given phenomenon rather than towards the isolation of causative factors. It was further explained that educational surveys were particularly versatile and practical, especially for the administrators in that they identify present conditions and point to present needs. Educational surveys cannot make the decisions for the Administrators, but they can provide him/her with information on which to base sound decisions.

To obtain the results of this study, both qualitative and quantitative research methodologies were used. According to Gall et al (1996:373) quantitative research methodology is a method of collecting facts and it studies the relationship of one set of facts to another. This method uses scientific techniques that are likely to produce quantified and, if possible generalizable conclusions. Gall et al (ibid)

further explained that qualitative research methodology is a method of collecting facts to understand individuals' perceptions of the world. Qualitative methodology was used on semi-structured interviews for headteachers and heads of departments (HODs) and self-administered questionnaires were used for teachers of Physics.

3.3 Study Population

The target areas were all the 71 High Schools in the Copperbelt Province (MoE, 2002). The population subjects included Headteachers, Deputy Headteachers, and Heads of Science Departments and teachers of Physics. The Copperbelt Province at the time of the study had 71 High schools composed of 44 Government (GRZ), 8 Grant Aided (GA) and 19 Private Schools (PS). The 71 High Schools made a study population of 71 school headteachers, 71 Heads of Science Departments and 400 teachers of Physics which gave a total of about 542.

3.4 Sample and Sampling Procedure

3.4.1 Sampling Procedure

To determine the sample, several factors were considered. The High Schools were located in urban, peri-urban and rural areas. The Copperbelt Province was composed of ten Districts namely: Kitwe, Ndola, Chingola, Luanshya, Mufulira, Chililabombwe, Masaiti, Chambishi, Mpongwe and Kalulushi.

Since the study was focusing on the measures that School Administrators had put in place in response to the poor performance in 'O' level Physics examinations, only Districts which had High Schools offering pure Physics as a subject were considered for selection. A stratified sampling technique was used to arrive at the

twelve High Schools. Firstly, all High Schools on the Copperbelt were put in categories such as government (GRZ), grant aided (GA) which were supported by both government and missionaries, and private (PS) High Schools. Secondly, the High Schools were further categorized, based on pupils' performance in 'O' level Physics examinations, into two categories that were high achieving and low achieving schools. The schools where most pupils obtained pass grades of five or better were considered High Achieving/Performing Schools (HAS). The schools where most pupils obtained a pass grade of six or less were considered Low Achieving/Performing Schools (LAS). The Examinations Council of Zambia (ECZ) School Certificate and G.C.E Examiners' Reports were used to obtain information about pupil's performance in Copperbelt High Schools. Thirdly, from these schools, twelve schools which offered pure Physics as a subject were selected, four schools from each of the three categories that are government, grant aided and private High Schools. Purposive selection was used when choosing the twelve High Schools. In purposive sampling, researchers handpick the cases to be included in the sample on the basis of their judgement of their typicality. In this way, they build up a sample that is satisfactory to their specific needs (Cohen et al; 2003:103). This study also employed stratified techniques due to many different types of subjects that were covered. The following High Schools were covered during the research study:

In the GRZ category: Helen Kaunda, Kitwe Boys, Mindolo and Kansenshi.

In the GA category: Dominican Convent, Ibenga Girls, Saint John's Convent and Sacred Heart Convent.

In the PS category: Mpelembe Secondary, Saint Andrews, Ndola Modern and Muzi.

3.4.2 Sample Size

A total of 76 respondents representing 14% of the total population of 542 subjects in 71 High Schools which offered 'O' level Physics were finally obtained from the estimated 100 subjects. The estimated 100 subjects comprised 12 Headteachers (H/Ts), 12 Heads of Science Departments (HODs) and 76 teachers of Physics (T/Ps). The distribution of this sample is shown in table 4:

Table 4: Distribution of Respondents per School Category

Category	Name of High school	H/Ts N (%)	HODs N (%)	T/Ps N (%)	Total N (%)
Government Schools	Kitwe Boys	1 (1.3)	1 (1.3)	6 (7.9)	8 (10.5)
	Kansenshi	1 (1.3)	1 (1.3)	6 (7.9)	8 (10.5)
	Mindolo	1 (1.3)	1 (1.3)	6 (7.9)	8 (10.5)
	Helen Kaunda	1 (1.3)	1 (1.3)	7 (9.2)	9 (11.8)
Total		4 (5.2)	4 (5.2)	25 (33)	33 (43.4)
Grant Aided Schools	Dominican Convent	1 (1.3)	1 (1.3)	4 (5.2)	6 (7.9)
	Ibenga Girls	1 (1.3)	1 (1.3)	4 (5.2)	6 (7.9)
	Saint John's Convent	1 (1.3)	1 (1.3)	3 (3.9)	5 (6.5)
	Sacred Heart Convent	1 (1.3)	1 (1.3)	3 (3.9)	5 (6.5)
Total		4 (5.2)	4 (5.2)	14 (18.4)	22 (28.9)
Private Schools	Mpelembe	1 (1.3)	1 (1.3)	5 (6.5)	7 (9.2)
	Saint Andrews	1 (1.3)	1 (1.3)	3 (3.9)	5 (6.5)
	Ndola Modern	1 (1.3)	1 (1.3)	3 (3.9)	5 (6.5)
	Muzi	1 (1.3)	1 (1.3)	2 (2.6)	4 (5.2)
Total		4 (5.2)	4 (5.2)	13 (17.1)	21 (27.6)
Grand Total		12 (16)	12 (16)	52 (68)	76 (100)

Key
H/T: - Headteacher
HOD: - Head of Department
T/P: - Teacher of Physics

It can be seen from table 4 that the majority of respondents 43.4% (N=33) were drawn from GRZ schools. 28.9% (N=22) respondents were from GA schools and 27.7% (N=21) respondents were from Private schools.

3.4.3 Drop out of Sample

The estimated number of 100 subjects could not be achieved because 24 of the expected 76 teachers of Physics were either sick, passed away, or had resigned from the Ministry of Education for greener pastures.

3.5 Research Instruments

Data for this study was gathered through questionnaires and interviews (see Appendix I,II and III). In addition to the questionnaires and interviews, observations were also conducted using the observation checklist (refer to Appendix IV), to verify the information given by the respondents.

3.6 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 sources, that is, through questionnaires, interviews and observations.

To ensure external validity, literature review was used in developing the questions to the respondents. External validity is the extent to which a research study's findings could be applied to a situation beyond the study itself, (Leedy and Ormrod, 2001).

3.7 Data Collection Procedure

Data collection was conducted in the first term of the 2006 academic year from 12th February to 31st March.

First permission was sought from the Copperbelt Provincial Education Officer in order to obtain data from the sampled schools. At every school, the researcher first saw the Headteacher in order to seek for permission. The Headteachers were assured that the data collected from their schools were purely for academic purposes and that the information would be treated with strict confidence.

3.8 Data Collection Techniques

The following were techniques used to obtain data:

3.8.1 Administration of Semi-Structured Interview Schedules to Headteachers and Heads of Science Departments

Face to face interviews were conducted to obtain information on Headteachers and Heads of Departments views on underachievement in Physics (refer to Appendix I and II). Additionally the interviews were used to obtain information on proposed measures to be put in place in order to improve performance in Physics.

3.8.2 Questionnaires for Teachers of Physics

Semi-Structured questionnaires (refer to Appendix III) were administered to the teachers. The teachers were not required to write their names to allay fears of victimization.

3.8.3 Observations

The researcher inspected the state of the buildings used as Physics laboratories in the selected schools and further looked at the availability of teaching and learning materials in the Physics stores rooms. The observation checklist was used (refer to Appendix IV)

3.9 Data Analysis

The quantitative data collected through the questionnaires were analyzed using the computer generated frequencies and percentages. In order to present statistical information , bar graphs and pie charts were also used.

Interview data were analyzed qualitatively by coding and 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 against another. This procedure led to an improvement in the quality of data and accuracy of the findings. Different sources of data such as observations, questionnaires and interviews were used to facilitate triangulation.

3.10 Data Interpretation

Data interpretation was based on the data which were collected and analyzed. Data were then put into groups according to strata of respondents and objectives. Comparisons were made and conclusions drawn to determine the measures the Administrators of High Schools had put in place as a response to the poor performance in Physics.

3.11 Ethical Concerns

All respondents were assured of confidentiality on the information they gave during and after the research. The questionnaires were issued to the respondent in person. Interviews were conducted in closed rooms by the researcher himself.

CHAPTER 4: PRESENTATION OF RESEARCH FINDINGS

4.1 Preview

This chapter presents findings of the research on responses of School Administrators to poor performance in O-level Physics examinations. The presentation of the findings is done under the headings drawn from the objectives of the research. The headings are subdivided into age, sex, educational background of respondents and length of service for the Headteachers, Heads of Science Departments and teachers of Physics. Then views held by School Administrators and teachers of Physics from high and low performing schools on underachievement of pupils in the subject are presented. Subsequent sub-headings are: views of Headteachers, Heads of Science Departments and teachers of Physics on the factors contributing to poor performance in Physics examinations, state of Physics laboratories , availability of teaching materials, Laboratory Technicians, text books in high and low performing schools. The final sub-heading looks at measures proposed by Headteachers, Heads of Science Departments and teachers of Physics in response to improve performance in Physics and possible actions which could be employed to improve the performance.

4.2 Age of Respondents

The majority 83% (N=63) of the subjects fell between 25 and 45 years old. 17% (N=13) of them mainly Headteachers were above 45 years old.

4.3 Sex of Respondents

Most subjects in the sample were male (79% or N= 60). Of which constituted 13% (N=10) Headteachers,13% (N=10) Heads of Science Departments (HODs) and

53% (N=40) teachers of Physics. 21% (N=16) of the subjects were female consisting of 3% (N= 2) Headteachers, 3% (N=2) Heads of Departments and 15% (N=12) being teachers of Physics.

4.4 Educational Background of Respondents

(a) Headteachers

There were 16% (N=2) of the Headteachers with Master's Degrees in Theological and Linguistics respectively; 68% (N=8) of them had Bachelor's degree in Social sciences and 16% (2) with an Advanced Diploma in Mathematics.

(b) Heads of Science Departments

8% (N=1) of the HOD had a Master's Degree in Physics Education, 76% (N=9) of them had Bachelor's degrees Biology and Chemistry and 16% (N=2) had Diplomas in Biology.

(c) Teachers of Physics

7.7% (N=4) of the teachers of Physics had Bachelor's Degrees in Physics Education and 92% (N=48) of them had Diplomas and Advanced Diplomas. Of which 15% (N=8) had Diplomas in Biology, 19% (N=10) in Mathematics, 43% (N=22) in Physics and 15% (N=8) had Diplomas in Social sciences.

4.5 Subjects learnt during Teacher Training

It was learnt that 50% (N=26) of the teachers of Physics had studied their teaching subject while 50% (N=26) of the other teachers of Physics had not been trained to teach Physics.

4.6 Length of Service of the Respondents

Headteachers- 92% (N=11) of the Heads had served between 3 years and 7 years and 8% (N=1) of them had served for less than 1 year as Headteacher.

84% (N=10) of the HODs had served for less than 1 year and only 16% (N=2) of them had served for more than 1 year.

The majority of the teachers of Physics 96% (N=50) had served for between 4 years to 15 years.

4.7 Views Held by School Administrators on the Poor Performance in Physics Examinations

(a) High Achieving/Performing Schools (HAS)

(i) Physics teaching and learning materials are very expensive.

Quantitative data from questionnaires showed that the majority of School Administartors 37.5% (N=9) specifically including 21% (N=5) H/Ts and 16.5% (N=4) HODs stated that Physics as a subject is very expensive to run in comparison to other subjects. The high cost of running pure Physics in schools had led the schools to be poorly equipped in learning and teaching aids.

83% (N=10) of the HODs of Science mentioned that the poor performance in Physics examinations caused pupils to develop a negative attitude against the subject. The pupils thought that the chances of them failing Physics examinations were very high. This negative attitude leads to very few pupils opting to take up O- level Physics as a subject and even fewer pupils manage to seat for the end of year examinations. Table five shows the number of pupils taking Physics in the selected High School:

Table 5: The Number of Grade 12 Pupils Taking Physics in Selected High Schools on the Copperbelt in 2006

Name of High School	Category	Total Number of Pupils in Grade 12	Number of Pupils Taking Physics (%)
A	GRZ	325	40 (12)
B		325	66 (20)
C		359	40 (11)
D		401	25 (6)
E	GA	45	5 (11)
F		35	6 (17)
G		60	28 (47)
H		62	25 (40)
I	PS	70	15 (21)
J		80	18 (23)
K		137	137 (100)
L		85	20 (24)
Total		1984	425 (21)

Key:
GRZ: Government High School
GA: Grant Aided High School
PS: Private High School

In table five letters were used for names of schools in order to protect the identity of the schools.

With the exception of School K, where Physics is a compulsory subject to all pupils, only 16% of the total number of Grade 12 pupils in the selected high schools took the subject.

(ii) Regular workshops were required for teachers of Physics. 33% (N=8) of the respondents including 25% (N=6) H/Ts and 8% (N=2) HODs stated that teachers of Physics needed regular workshops on teaching and learning Physics.

(iii) Administrators did not show much interest to the underachievement of pupils in Physics examinations. 25% (N=6) of the respondents including 17% (N=4) Headteachers and 8% (N=2) Heads of Science Departments stated that the poor

performance in Physics examinations was a problem for the Science Department. One headteacher said:

> "Poor results in Physics examinations are a problem for the Science Department and not the School Administration."

(b) Low Achieving/Performing Schools (LAS)

Information generated by questionnaires indicated the following:

(i) It is not a problem for the School Administration but one for the Science Department.

When asked whether Headteachers required some special training to effectively head a school that offered Physics, 67% (N=16) of the respondents including 42% (N=10) Headteachers and 25% (N=6) heads of science departments mentioned that the training was not necessary. The study further revealed that the majority 67% (N=16) of the headteachers and heads of science departments did not think the failure rate in Physics examinations was a problem for the School Administration but rather it was a problem for the teachers of Physics.

(ii) Teachers of Physics in schools were not qualified to teach the subject.

50% (N=12) of the respondents, including 25% (N=6) H/Ts and 25% (N=6) HODs, were of the view that the majority of teachers of Physics were unqualified. High school Physics was supposed to be handled by degree holders or Advanced Diploma holders, unlike the current situation where 92% (N=48) teachers of Physics were only Diploma holders.

Table six shows the educational qualifications of teachers of Physics in the 12 selected high schools.

Table 6: Educational Qualifications of Teachers of Physics

School	Degree Holders	Advanced Diploma	Diploma	Total N
K	4 (100%)	0	0	4
B	0	3 (50%)	3 (50%)	6
C	0	3 (47%)	4 (57%)	7
E	0	0	4 (100%)	4
D	0	2 (33%)	4 (67%)	6
L	0	2 (67%)	1 (33%)	3
A	0	3 (50%)	3 (50%)	6
H	0	1 (25%)	3 (75%)	4
I	0	0	3 (100%)	3
J	0	0	2 (100%)	2
G	0	2 (50%)	2 (50%)	4
F	0	2 (67%)	1 (33%)	3
Total	4 (7.7%)	18 (34.6%)	30 (57.7%)	52 (100%)

Letters have been to protect the identity of the Schools

The majority of teachers of Physics 57.7% (N=30) were Diploma holders, 34.5% (N=18) were Advanced Diploma holders and only 7.7% (N=4) were degree holders in the selected High Schools.

4.8 Views Held by the Teachers of Physics Concerning Underachievement of Pupils in O-Level Physics Examinations

Teachers of Physics from high and low performing schools were asked what they thought about the factors contributing to the low results of pupils in O-level Physics examinations. They brought out a number of views presented in tables 7a and 7b.

It is worthy to note that 62% (N=32), i.e. almost two thirds of all the teachers were with the view that lack of support by the School Administration was among the major factors contributing to poor performance in Physics examinations.

Table 7a: Views Held by Teachers of Physics from High Performing Schools

Views	Respondents % (N=52)	Rank
Pupils commonly believed that Physics is the most repulsive of all the subjects.	58% N=30	1
Pupils do not understand how Physics Education is used in the real world.	54% N=28	2
The 'O' level Physics syllabus is too bulky to complete in three years.	19% N=10	3

Note that more than one respondent mentioned a particular view.

(a) Views Held by Teachers of Physics from High Performing Schools Included:

Data gathered through interviews and observations revealed that pupils commonly believe that Physics is the least attractive of the entire subjects. 58% (N=30) of the teachers of Physics mentioned that most pupils had a negative attitude towards the subject and they were convinced that no one could get a good paying job if the studied a course or university program that was based on Physics.

However the researcher is of the view that the teachers in this case do not adequately explain to the pupils the importance of Physics because they may have not been qualified to teach the subject. Physics is vital in the training of doctors, pilots, engineers and many others. These professions reward well financially.

The researcher also felt, that pupils have no idea about the use of Physics in their daily lives. 54% (N=28) of the teachers pointed out that it was a great challenge to convince

the pupils about the importance of learning Physics. When asked for the reasons why it was a great challenge to convince the pupils, the following reason was given:-

> "Teachers themselves do not seem to appreciate and understand the importance of Physics to every day life."

Teachers of Physics also stated that the 'O' level Physics syllabus is bulky and it is difficult to complete the syllabus in three years. 19% (N=10) of the teachers of Physics mentioned that many topics in the syllabus were not well outlined and so it was difficult to interpret them and effectively teach them to the pupils.

(b) Views Held by Teachers of Physics from Low Performing Schools included:

Table 7b: Views Held by Teachers of Physics from Low Performing Schools

Views	Respondents % (N=52)	Rank
Inadequate teaching aids and instructional materials.	92% N=48	1
Physics teaching materials and text books are too expensive.	87% N=45	2
The administrators do not fully support the teaching and learning of Physics in the school.	62% N=32	3

Data collected through interviews and observations indicated that the majority 92% (N=48) of the teachers of Physics held the view that there were very inadequate teaching aids and instructional materials in schools. Asked if they could make teaching aids from locally available materials, 67% (N=35) of the teachers of Physics expressed lack of interest to that suggestion.

Teachers from low performing schools felt that Physics teaching materials are too expensive. 87% (N=45) of the teachers of Physics mentioned that good Physics text books were very expensive, that the price of one good Physics text book could buy as many as six good English language text books.

The data collected through questionnaires revealed that in 67% (N=8) high schools the Science departments received the same financial allocation as other departments not appreciating the fact that Physics is a subject that required more financial allocation from the School Administration.

The majority of respondents 85% (N=45) mentioned that the Headteachers and their Deputies rarely visited the science department and the Physics laboratories making it difficult for these Administrators to fully appreciate the problems being faced by teachers of Physics in teaching the subject.

Generally, the study showed that 62% (N=32) of the teachers of Physics were of the view that the School Administration in their respective schools could do more than what was being done to improve.

4.9 Factors Contributing to the Poor Performance in Physics Examinations

(a) Views of Headteachers, Heads of Science Departments and Teachers of Physics on the Factors Contributing to Poor Performance in Physics Examinations.

The School Administrators and teachers of Physics were asked about factors which contributed to poor performance in Physics Examinations. The research finding are shown in table 8.

Table 8: Views Held by School Administrators and Teachers of Physics on Factors Contributing to Poor Performance in Physics Examinations

Factors	Respondents. % (N=76)	Rank
Low morale and poor conditions of service of teachers.	76% (N=58)	1
Lack of learning materials and teaching aids.	72% (N=55)	2
Lack of support to teaching and learning of Physics by School Administration.	68% (N=52)	3
Attitudes of teachers and pupils towards Physics.	53% (N=40)	4
Low morale among pupils towards Physics.	33% (N=25)	5
Poor student examination techniques used due to inadequate preparation.	26% (N=20)	6

Note that more than one respondent mentioned a particular reason.

The study revealed that 76% (N=58) of the respondents felt that poor conditions of service for teachers was the major cause of the poor performance of pupils in Physics examinations because the teachers of Physics are forced to spend more time outside the classroom looking for money. Ranked second was lack of learning materials and teaching aids with 72% (N=55) of the respondents saying so. Lack of concern and support from School Administrators was ranked third with 68% (N=52) of the respondents saying so. The Headteachers interviewed expressed little interest about the poor performance of pupils and mentioned that it is a problem for the science department. 53% (N=40) of the respondents mentioned that the attitude of the teachers and pupils towards Physics as a subject was another factor and it was ranked fourth. Low morale among pupils towards Physics was ranked fifth with 33% (N=25) of the respondents mentioning it. The general discouragement arouse from the lack of sufficient teaching and learning materials and in most situations teachers had to make pupils imagine some Physics apparatus which were not available as teaching aids. The last factor ranked sixth was poor student examination techniques where 26% (N=20) of the respondents pointed it out. It was explained that lack of Physics materials made it

difficult for teachers to prepare experiments for the pupils and this led to pupils not learning the techniques and skills required for the examinations. These six factors were the most out standing as the main contributors to the poor performance in Physics 'O' level examinations.

(b) State of Physics Laboratories in the Selected High Schools

A physical inspection of the schools by the researcher revealed the following findings presented in table 9.

Table 9: State of Physics Laboratories in the Selected High Schools

School	Good State	Moderate State	Poor State
Mpelembe	*		
Kitwe Boys		*	
Helen Kaunda			*
Saint John's Convent		*	
Mindolo			*
Saint Andrews		*	
Kansenshi			*
Dominican Convent		*	
Ndola Modern			No laboratory
Muzi			*
Ibenga Girls		*	
Sacred Heart			*
Total	1 (8.3%)	5 (41.7%)	6 (50%)

Key:

Good State: Good physical building, sufficient stools for pupils, apparatus sufficient for group work.

Moderate State: Good physical building, stools not enough, Physics apparatus enough only for lesson demonstrations.

Poor State: Dilapidated physical building, stools not enough for the pupils and non availability of Physics apparatus.

The study released that the majority 50% (N=6) of selected high schools had Physics laboratories in a poor state. 41.7% (N=5) schools had laboratories in moderate state, and only 8.3% (N=1) had a laboratory in a good state. One of the low performing private school did not have a laboratory at all, an ordinary classroom was used for practicals. The only high school with a well equipped Physics laboratory was a high performing well established private school. The study further revealed that a high performing government high school had a Physics laboratory in a good operational state. In the low performing high school the physical observations conducted by the researcher revealed that the Physics laboratory was ill equipment and used as a mere classroom

(c) Availability of Material Resources for the Teaching and Learning of Physics in 6 Selected High Schools

In order to establish the availability of material resources for teaching and learning Physics, the researcher under took a physical inspection of the Physics laboratories and store rooms in six of the selected schools. The six schools were selected from the government (GRZ), grant aided (GA) and private schools (PS) categories. Based on Physics examination results only a high performing and low performing schools were selected from each category consisting of GRZ, GA and PS.

A list of suggested apparatus and equipment for the O-level Physics syllabus (Curriculum Development Centre, 2000: 45-46) was then used . To estimate the level of availability of essential equipment the researcher used the following scales:

Adequately stocked- number of equipment (20 and more units) and is sufficient for class practical work.

Not usable- equipment is faulty, but can be shown to pupils.

No available- equipment is not available.

Data collected through physical inspection of the Physics laboratories and store rooms in the six schools the is presented in table 10a and 10b. The physical inspection was conducted in order to evaluate the availability of materials and resources for teaching and learning O-level Physics.

Table 10a: Availability of Materials for Teaching Physics in High Performing Schools

Essential Equipment	GRZ			GA			PR		
	Adeq-uate	Not Usable	Not Avail-able	Adeq-uate	Not Usable	Not Avail-able	Adeq-uate	Not Usable	Not Avail-able
Thermal Physics	√				√		√		
Electric current	√				√		√		
Light		√			√		√		
Measurements and Mechanics	√			√			√		
Magnetism	√			√			√		
Computer		√		√			√		
Slide projector			√	√					√
Over-head projector			√			√	√		
Film projector			√		√		√		
Teaching models			√		√		√		

Key:
GRZ: Government high school
GA: Grant Aided high school
PR: Private high school

Table 10b: Availability of Materials for Teaching Physics in Low Performing Schools

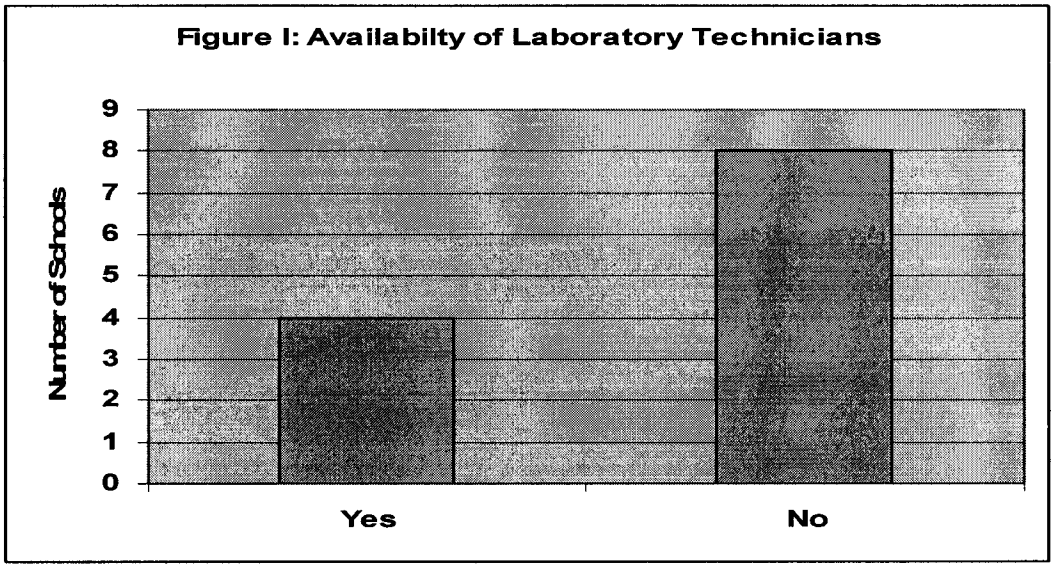
Essential Equipment	GRZ (N=4)			GA (N=4)			PR (N=4)		
	Adeq-uate	Not Usable	Not Avail-able	Adeq-uate	Not Usable	Not Avail-able	Adeq-uate	Not Usable	Not Avail-able
Thermal Physics			√			√		√	
Electric current		√				√		√	
Light			√		√				√
Measurements and Mechanics		√		√			√		
Magnetism	√					√			√
Computer		√			√		√		
Slide projector			√			√			√
Over-head projector			√		√				√
Film projector			√			√			√
Teaching models		√			√			√	

The study revealed that among the three high achieving schools (refer to table) a well established private school was adequately stocked with most materials to teach Physics. A grant aided school was second while a government school was the least stocked in the category.

The study revealed also that all the three low performing schools (refer to table) were poorly stocked with materials. The majority of the materials in these schools were either not usable or not available at all.

The researcher observed that in both high achieving and underachieving schools the availability of physical items such as slide projectors, overhead projectors and film projectors revealed a rather gloomy picture. It can be seen from tables 14a and 14b showed that there was almost a total absence of such items.

(d) Availability of Laboratory Technicians/ Assistants in the Selected High Schools



The research revealed that the majority that 67% (N=8) of the schools i.e. two thirds of them did not have a person employed as a laboratory technician or assistant while 33% (N=4) of the schools had someone. In these schools the teacher to pupil ratios were also found to be high. The high number of pupils led teachers to be given over 30 teaching periods per week. Laboratory technicians assist teachers of Physics to prepare class demonstration and practicals. .. Teaching Physics requires more input than other subjects and lack of laboratory assistants with the current teaching overload cause fatigue which reduces teacher effectiveness.

(e) Availability of Physics Text books

Achievement of pupils in any subject is affected directly by the availability of text books in schools. The high quality text book is the single most influential factor in the classroom.

In order to establish the availability of Physics text books the researcher undertook their physical inspection in the selected High Schools.

The percentage of the pupils accessing the Physics text book was placed in the four scales and is presented in table 11:

Table 11: Availability of Physics Text Books

Percentage of pupils sharing one Physics text book (%)	Government High Schools	Grant-Aided High Schools	Private High Schools	Total Number of Schools	Total Percentage
0-25	3	3	1	7	58
26-50	1	1	1	3	26
51-75	0	0	1	1	8
76-100	0	0	1	1	8
Total	4	4	4	12	100

The study revealed that in 58% (N=7) of the high schools only 0-25% of pupils had access to Physics text books. The Physics text books available in the school had to be shared one between three pupils during lessons. Of the seven high schools with very few pupils accessing Physics text books 25% (N=3) were Government schools, 25% (N=3) Grant Aided High schools and 8% (N=1) was a private high school. The research revealed also that Physics text books were in short supply with a few copies in schools being used by the teacher to prepare notes for teaching. Physical inspection revealed that the majority of Physics text books found in the high schools were written by foreign authors, there were very few Physics text books by Zambian writers. As a result pupils spend most time copying notes, i.e. the teacher gives more factual information than encouraging problem solving and higher level cognitive activities. The study further showed that the most common book used in schools was Complete Physics which is

prepared by foreign authors while books such as Zambian O-level Physics were rarely found in the selected schools.

(f) Comparison of Teacher to Pupils ratio in High and Low Achieving Schools

In high performing schools it was discovered that the ratio of teacher to pupils was an average 1 to 45 while in low performing school it was on average 1 teacher to 60 pupils.

In conclusion, the main finding were identified: The majority of the teachers of Physics had poor morale to teach due to what they referred to as insufficient conditions of service. The majority of teachers of Physics lamented that their status and standing in the community, as well as their purchasing power, has been greatly eroded over the past twenty years. The majority of high schools did not have adequate numbers of Physics teaching and learning materials. Severe shortages were found to be in items such as computers, slide projectors, overhead projectors and film projectors. The Physics laboratories were in a bad state and in one private schools non existent. This was the general situation with the exception of a well established private School which was found to have adequate numbers of teaching and learning materials and the Physics laboratory was in a good state. In majority of the high schools text books were subjected to be shared among 5 and 6 pupils. The study further showed that most of the Physics text books present in schools were prepared by foreign authors with the most common book being Complete Physics and in some cases the Physics text books were only available to teachers. Text books such as Zambian O-level Physics were rarely found in the selected schools. The problems which were faced in all schools were acquisition of

materials. The text books were said to be too expensive in comparison with textbooks in other subjects.

4.10 Suggestions of School Administrators and Teachers of Physics in Response to Poor Performance in Physics

The School Administrators and teachers of Physics were asked to propose measures to improve performance of Physics.

(a) Measures proposed by Headteachers are given in table 12a:

Table 12a: Measures Proposed by Headteachers in Response to Poor Performance in Physics

Proposed Measures.	Respondents % (N=12)	Rank
To employ qualified teachers.	83% (N=10)	1
Offer Physics examination practice and remedial sessions.	67% (N=8)	2
To motivate pupils while teaching	58% (N=7)	3
Provide remedial lessons for pupils after classes.	50% (N=6)	4
Where possible emphasize the importance of Physics in the industry and everyday life.	42% (N=5)	5

The data revealed that 83% (N=10) of the headteachers mentioned that in order to improve the performance of pupils in examinations the teachers of Physics are supposed to be qualified to teach the subject. The Headteachers also pointed to the fact that the shortage of properly qualified teachers of Physics had forced them to employ teachers who are not qualified in the Physics. Some teachers of Physics were even deployed to teach the subject which they have not been trained to teach. 67% (N=8) of the Headteachers proposed that the teachers of Physics should give pupils regular examination practice and remedial sessions which must be marked and handed back to

the pupils for revision. 58% (N=7) of the Headteachers mentioned that pupils must be motivated to take up Physics as a subject. 50% (N=6) of the headteachers emphasized that teachers of Physics must offer remedial lessons to pupils who do not perform well in class. Ranked fifth was the proposal that pupils should be told about the importance of Physics in the industry and everyday life.

One Headteacher proposed that Engineers and Physicists must be invited to come and give talks to pupils about the benefits of Physics in everyday life.

42% (N=5) Headteachers proposed that as School Administrators they could easily facilitate any suggestion on which is intended to improve the performance of pupils in Physics. One Headteacher was quick to point out that the Heads of Science Department had to take up a leading role in the improvement of performance in Physics examinations.

(b) Measures proposed by Heads of Science Departments (HOD) are given in table 12b:

Table 12b: Measures Proposed by Heads of Science Department

Proposed Measures	Respondents % (N=12)	Rank
Teach the subject through practical sessions.	67% N=8	1
Teachers should spend most of their class time presenting good lessons.	58% N=7	2
Teachers prepare worksheets for the pupils.	42% N=5	3

67% (N=8) of the HODs proposed that Physics lessons must be taught through practical sessions. One HOD was quick to point out that practical lessons in Physics were difficult to organize because of lack of teaching and learning apparatus. In most cases the teachers just end up demonstrating experiments in class.

The data collected further revealed that 58% (N=7) of the HODs mentioned that good and well presented lessons were key to improving the performance of pupils. The HODs emphasized that constant supervision and regular lesson observation were important to ensure that teachers present good lessons. 42% (N=5) of the HODs mentioned that regular worksheets given to pupils would help them build up confidence for the examinations. The HODs further explained that the worksheets must be marked and handed back to the pupils without delay as a quick feedback would motivate pupils to work harder.

(c) Measures Proposed by Teachers of Physics

Table 12c: Measures proposed by Teachers of Physics

Proposed Measures	Respondents % (N=52)	Rank
Organize in- house teacher's workshops.	58% N=30	1
Twin high schools with better resourced ones that are within and out of the country to share Physics learning and teaching materials.	56% N=29	2
Increase contact periods for Physics classes.	50% N=26	3

The data collected revealed that 58% (N=30) of the teachers of Physics proposed that School Administrators must organize and facilitate in-house workshops so that teachers of Physics from different schools could share ideas and experiences. 56% (N=29) of respondents suggested that schools that are poorly stocked in teaching materials for Physics should make effort to partner schools with better resourced ones that are within and out of the country. The partnerships would benefit poorly stocked schools because the adequately stocked schools would share Physics teaching and learning materials. 50% (N=26) of the teachers of Physics explained that the contact periods with pupils should be increased. The study revealed that on average for Physics was given four

periods per week. Contact hours with pupils are very critical because during this time a teacher can effectively ground the pupils. Asked about the desired number of periods, 58% (N=30) of the teachers proposed that six contact periods per week would be much better. This proposal was in line of MoE which recommends for pure Physics six contact periods per week.

4.11 Views Held by Teachers of Physics to improve Performance of Pupils in Examinations

The teachers of Physics from the high and low achieving schools were asked to suggest possible teacher action which could be employed in order to improve achievement in Physics. Measures proposed by T/Ps are presented in table 13.

(a) Views of Teachers from High Performing Schools About Possible Actions to Improve Achievement of Pupils

Table 13a: Possible Actions to Improve Performance in Physics stated by Teachers from High Performing Schools

Possible Teacher Action	Respondents % (N=52)	Rank
To mark pupil's tests and hand them back quickly.	48% (N=25)	1
To mark pupil's homework, assignments, providing detailed feedback to pupils.	44% (N=23)	2
Motivate pupils whenever teaching Physics.	42% (N=22)	3
To offer pupils remedial activities after classes or during the weekend.	23% (N=12)	4
To produce worksheets and handouts for pupils.	15% (N=8)	5

Note that more than one respondent mentioned a particular reason.

The data collected from questionnaires administered to teachers from high performing schools revealed that 48% (N=25) of the teachers stated that pupils get disappointed if their test results are delayed. One teacher of Physics explained that tests could be used to

motivate pupils and guide them in the learning process. 44% (N=23) of the teachers said that prompt marking of pupils scripts and coupled with effective revision of the work. It was felt that if teachers went over test with their pupils and showed them how to answer questions then the pupils would gain confidence in themselves. 42% (N=22) of the respondents admitted that Physics was a demanding subject and as a result teachers must deliberately motivate pupils to continue working hard. 23% (N=12) of the teachers said that they offered remedial lessons to pupils after classes. They were quick to point out that in most cases the pupils have to be forced to come for these lessons. 15% (N=8) of the teachers said that these handouts would assist pupils prepare for the examinations. 2% (N=1) teacher was quick to point out that regular worksheets given to pupils meant that teachers had a lot of scripts to mark and this posed a challenge because the were a number of classes to attend to.

(b) Views of Teachers from Low Performing Schools about Possible Actions to Improve Achievement of Pupils

Table 13b: Possible Actions to Improve Performance in Physics as stated by Teachers from Low Performing Schools

Possible Teacher Action	Respondents % (N=52)	Rank
To attend regular workshops on Physics Education.	42% (N=22)	1
To source Physics text books for use during lessons.	27% (N=14)	2
Pupils spend time during vacation on Physics related work.	19% (N=10)	3

Note that more than one respondent mentioned a particular reason.

The data collected from teachers of Physics at low performing schools revealed that 42% (N=22) of the respondents said that in this ever changing world there is need for regular workshops were teachers would meet and share ideas. It was emphasized that the

workshops should specifically focus on improving performance in Physics examinations. The respondents mentioned that such workshops would provide a plat form were ideas and strategies would be shared. 27% (N=14) of the teachers of Physics said that teaching Physics requires more input than other subjects. Inadequate numbers of text books in schools puts pressure on the teacher to spend a lot of time giving teaching notes to the class. The respondents suggested that the private industry could be approached by School Administrator for support in teaching materials. 19% (N=10) teachers said that they gave pupils task during vacations which were intended to make pupils appreciate Physics in every day life.

In concluding this chapter, the following main findings were identified: sex, age, educational background, experience in service and length of period as Headteacher and Head of Science Department served at a particular school. Other sectors considered included, views held by Headteachers, Heads of Science Departments and teachers of Physics on the poor performance. The measures to be put in place in order to improve the performance of pupils were also looked at. The chapter also considered Physics examinations results from a high performing school and results from a low performing school over a period of eight years.

The research revealed that the majority 53% (N=28) of the teachers of Physics were only Diploma holders. The study further revealed that there was a shortage of Bachelor's degree holder among the teachers of Physics. This shortage made it difficult for the Headteachers to recruit graduate teachers of Physics. This shortage also led to the teachers being overloaded with work. Such overloading causes fatigue, as the teacher to

pupil ratio is too high. It reduces teacher's effectiveness and causes lack of preparation of class demonstration and practicals.

Generally, it was found that both Headteachers and Heads of Science Departments were not given any training or orientation after they had been appointed to the post.

The measures proposed to be put in place by School Administrators in order to improve performance included schools going into partnership with other schools, teachers of Physics offering remedial classes, making Physics lessons more practical, among others.

The outstanding view held by the Headteachers was that the poor performance in Physics examinations was not a problem for the School Administrators but one for the Science Department.

CHAPTER 5: DISCUSSION OF FINDINGS

5.0 Introduction

Chapter four has presented the research findings. This chapter discusses the findings of the study. All the research questions have been addressed in this chapter. Although the size of the sample for this study was small, the analysis of this study confirmed several findings reported by various researchers.

5.1 Discussion of Findings

The study sought to establish views held by School Administrators and teachers of Physics concerning poor performance of pupils in O-level Physics, their views about factors contributing to underachievement in pure Physics and finally possible measures which could be employed to improve the performance of candidates in the subject.

The study addressed the question what were the views of School Administrators and teachers of Physics on poor performance of pupils in O-level Physics examinations. The Headteachers has the major responsibility of promoting excellence in a school, encouraging students and teacher performance.

Firstly, all interviewed Headteachers from high achieving schools (HAS) were holding views that it was the most important reason for them being in school, highlighting the importance of excellence in student and teacher performance. They also showed their concern about the high underachievement of pupils in O-level Physics.

Secondly, sixty seven per cent of the Headteachers from low achieving schools (LAS) hold the view that the poor performance in O-level Physics examinations was not their problem, but one for the Science Department which they believe is directly responsible

for the subject. This finding is consistent with the finding of Mwanza (2004) who found that school management practices, both effective and ineffective Headteachers, influence the performance of teachers and pupils.

The research further revealed that Headteachers of high achieving schools (HAS) have strong academic background. In terms of academic credentials 33% (N=2) of the Headteachers had Master's degrees in Theological and Linguistics respectively. 67% (N=4) of them had Bachelor's degrees in Social sciences. Interestingly it can be noted that none of the Headteachers was trained in Physics Education. This finding is consistent with the findings of Kostyuk (2004:92) who pointed out that " Physics educators are scare in senior posts like in the directorship." This finding was also in line with the findings of Muwanga-Zake's study in South Africa.

Muwanga-Zake (2000:8) observed that Science educators are relatively fewer in administrative work, " their absence from higher positions might imply that important policy decisions are made without professional input from Science educators."

Research further revealed that in terms of academic credentials Headteachers from low achieving schools (LAS) are moderately represented with 67% (N=4) holding Bachelor's degrees in Social sciences and 33% (N=2) held Advanced Diplomas in Mathematics.

Further research also revealed that Heads of Science Department of HASs have strong academic background: there were 8% (N=1) with a Master's degree in Physics Education and 42% (N=5) were holding Bachelor's degrees in Physics and Chemistry.

This finding is consistent with the finding of Kostyuk (2004:92) who found that only 20.2 per cent of the teachers in Physics Education were Heads of Science Department.

The majority of Heads of Science Department (HODs) interviewed in HAS indicated that their Headteachers moved around the school, exercised management by walking, communicated a hardworking culture in school. This finding is in line with Mwanza (2004) who pointed out that effective leadership exists in a school when the Head maintains high visibility and accessibility to pupils and teachers.

The study further revealed that 30% of the HODs of low achieving schools were holding the view that the School Administration show very little interest in underachievement of pupils. 68%(N=35) of the teachers of Physics which comprised the majority of respondents mentioned that the Headteachers and their Deputies rarely visited the Science Department and Physics laboratories making it difficult to these administrators to fully appreciate the problems being faced by teachers of Physics in teaching the subject. This finding was in line with Mwanza (2004) who pointed out that " those non-effective Headteachers did not monitor teachers' work. Teachers felt that no one in school was concerned about them, and therefore, a good number of them put little effort into their work, which accounted for teachers poor performance."

For teachers of Physics to do a good job, they must receive adequate support from their Heads. Two thirds of the teachers of Physics (N=32) were of the view that the School Administrators in their respective schools could do more than what was being done to improve Physics Education in schools.

High proportion of teachers indicated that they had never been supervised or observed by school inspectors while they were teaching. This finding was in line with Maqutu (2003) who pointed out that teachers were receiving little support from outside their schools.

50% (N=6) of School Administrators were of the view that the majority of the teachers of Physics were unqualified to teach the subject. The research revealed that 92% of the teachers were only Diploma holders. This finding was consistent with the findings of Kostyuk (2004) who pointed out that only 20.2% of teachers were qualified to teach Physics. In Zambia teachers for all senior Grades must have at least an Advanced Diploma in the teaching subject.

This finding was also in agreement with what Kayungwa (2002) quoting Darling-Hammond (2000) argues that assigning teachers to teach courses that they are not trained to teach has a negative effect on student achievement that qualified teachers are more effective in the classroom and their students demonstrate lesser achievement gains than students whose teachers are not qualified or fully prepared.

The findings were also consistent with the findings of Lungwangwa and Mwikisa (1998) that in HASs had strong academic background as they tend to have acquired more years of pre- service and in-service training than teachers in LASs. Teachers with more training tended to be more effective than those with less.

Dadey and Harber (1991) note that it is the duty of the Headteacher to ensure that his/her employer appoints qualified and competent teachers to his/her school.

According to Mwanza (2004:8) " Poorly performing schools were likely to be those were not being well managed and where teacher performance was low and deteriorating."

The literature revealed that one of the problems in Science Education in the Third worl was lack of qualified teachers (Lewin, 1990; Ogunniyi;1986). Data here showed that a majority of teachers of Physics in this sample were unqualified. This finding was consistent with findings of Haambokoma et al (2002) and Kostyuk (2004) who stated that only 20% of teachers were qualified to teach Physics.

Research revealed that 38% of School Administrators were holding a view that Physics teaching and learning materials are very expensive. Further research revealed that there was inadequate supply of teaching materials in LAS. School Administrators did not source adequate teaching and learning materials to provide enough support to the teachers and improve achievement of pupils. Research data showed that Headteachers in these schools did not place text books and other teaching materials as a priority and that they did not take the Ministry of Education to task to provide teaching materials. Teachers readily stated that they were performing poorly because, among other reasons, there were inadequate teaching materials. This finding was consistent with the findings of Bame's study in Ghana. Bame (1991) found that the main handicap that teachers faced was inadequate text books for children in some schools. This was one of the reasons which were lowering standards and dampening the morale of teachers in the schools.

Muchelemba (2001:80) argues that " the availability of resources in schools may motivate teachers to work hard and improve the performance of pupils."

The School Administrators stated that the Science Department demanded more financial allocation which the schools did not have. As a result of this damaged and worn out Physics apparatus is difficult or impossible to replace in the light of the hard economic times which had put a strain on the school's financial resources. Mac Donald and Rogan (1988) argue that well equipped laboratory would stimulate learner's interest and improve their performance in the subject.

33% of School Administrators including 6 Headteachers and 2 Heads of Science Departments were holding a view that teachers of Physics needed regular workshops on teaching and learning the subject. Majority (68%) of the teachers also attributed their poor performance to lack of staff development programmes in schools. This finding was in agreement with Banda (2002) who argues that the level of performance of teachers declines if not exposed to regular In-Service Educational Training (INSET) programmes.

The research also revealed that teachers of Physics suffer from being over-worked. On average they teach more than twenty-five periods per week. Such relatively higher loads prevail in most schools and make Physics unpopular. This finding is consistent with the findings of Kostyuk (2006) who found that " lack of teachers of Physics means that the few that are available are over-loaded, teaching over 30 to 40 periods of Science in a week, which is not acceptable as the maximum is 24 periods a week. Such overloading causes fatigue, and teachers to pupil ratio is too high."

It can be noticed from the findings in the HAS that the ratio of teacher to pupil was on an average 1 to 45 while in the LAS it was 1 teacher to 60 pupils. Ogunniyi, 1986; Macfarlane et al, 1990; Kool and Stool, 1993 concluded that one of the factors

attributing to poor achievement in school Science Education in Africa is overcrowding. This study's findings is in agreement with the above mentioned.

A majority of teachers of Physics (72%) in the study were holding the view that one of the prime reasons for lack of success in O-level Physics examinations is lack of laboratory resources. The teachers were holding the view that their poor performance was due to poor conditions for practical work. They stated that lack of materials and resources made it difficult for them to prepare experiments for pupils and this led to pupils not learning the techniques and skills required for the examinations.

Ninety-two percent (N=48) of the teachers mentioned that there were very few instructional materials in schools. However, when asked if they could make teaching aids from locally available materials, the majority of the teachers expressed no interest to that suggestion. These teachers' views are consistent with the findings of Maqutu (2003) who pointed out that availability of resources in schools does not necessarily translate into their use. The findings also agreed with Kayungwa (2002) which observed that crucial is utility rather than availability, that the teacher can perform poorly " if he/she is not committed or interested to find the correct materials and use the materials to the right learners." In this vein, we can rightly argue that higher student achievement is possible only if schools are not in short supply of teaching aids. However, none of the teachers in the study indicated that poor achievement of pupils was due to ineffective strategies they were using while teaching.

Although the Physics syllabus (CDC,2000) encourages the development of scientific inquiry and problem solving skills, Haambokoma et al (2002), and Kostyuk (2006) found that transmission of knowledge prevailed. Therefore, intensive use of teaching strategies where students played a passive role in their learning were among the main

causes of failure in O-level Physics examinations. Lackheed and Verspoor, (1991:115) adds: "A key determinant of student achievement is the quality of teaching. An effective teacher should posses at least a thorough knowledge of the subject matter being taught, an appropriate repertoire of pedagogical skills and motivation."

As noticed from the findings that only 13% (N=10) of the respondents the majority being Headteachers indicated that teachers' strategies in teaching the subject was one of the factors contributing to the underachievement of pupils in Physics.

Research on effective scholarly in the Third world indicates that the availability of textbooks and other print materials in schools influenced achievement in examinations (Fuller, 1985:1987, Keyneman & Loxey, 1983; Kool & Stool,1993). In addition, while owning a text book and being able to use it are different, studies elsewhere show that there is a significant relationship between achievement in examinations and availability of textbooks (Jamison et al ,1981; Doidge, 1997). Majority of School Administrators (67%) in this study said that pupils shared textbooks. This research revealed that in HAS the majority of the pupils (75%) had access to a Physics textbook while in LAS only 25% of the pupils had access to any Physics text book.

On availability of Physics text books, 72% (N=37) of the teachers of Physics in the study were holding the view that the prime reasons for lack of success in pure Physics examinations were shortage of textbooks. The study revealed that high performing schools had 51-75% of the pupils having access to Physics text books while the low performing schools had less than 25% of the pupils accessing text books. Consequently, teachers in these schools were the sole sources of knowledge and information. Kostyuk

(2006) adds: "As a result pupils spend most time copying notes, i.e. teachers give more factual information than encouraging problem solving and higher level cognitive activities. Improving the provision of textbooks is a promising investment option to boost pupils' achievement."

87% (N=45) of the teachers of Physics stated that good Physics text books were very expensive. The teachers mentioned that the price of one good Physics text book could buy as many as six good English language text books.

The study revealed that in 67% (N=8) High Schools the Science Departments received the same financial allocation as other departments not appreciating the fact that Physics is a subject that required more financial allocation from the School Administration and the Ministry of Education (MoE) in general.

Physics is perceived as a different subject and lack of textbooks and instructional materials compounded the problem of poor performance. 68% of the teachers of Physics cited Headteachers as the factor contributing to the poor performance in Physics. They mentioned that theHeadteachers were uncooperative when it came to buying text books and Science provisions. In fact, the teachers mentioned that their Heads had priority lists before they undertook projects.

Regarding educational qualifications, in HASs the majority of the Heads of Science Department were Bachelor's degree in Physics while others in Biology and Chemistry. One of the HODs in HASs had a Master's degree in Physics Education.

In LASs the HODs had Bachelor's degree in Biology and Chemistry and 16% (N=2) had Diplomas in Biology. In teems of length of service 84% (N=10) of the HODs had served for less than I year and only 16% (N=2) of them had served for more than I year. This

shows a lack of strong academic leadership in Science Departments because senior teachers left school and were replaced by young Graduates. Inexperienced teachers in Science Departments and they had to provide direction. They were charged with responsibilities of leadership and yet they themselves were not yet established.

School quality is highly linked to teacher quality. Rivkin, Hamushek and Kain, (1998) concluded that teacher quality is the most important determinant in school quality.

The success of a school depends, in a large measure, on the quality of its staff. Kayungwa (2000:6) postulates that " higher qualifications produced a markable improvement in school achievement as opposed to lower qualifications."

The findings in this study are in agreement with those of Kayungwa, (2002) who mentioned that " students achievement increases when students have teachers who are trained in developing higher thinking skills and are skilled at implementing hands-on experiences in the classroom."

Pupils' performance in any subject cannot be separated from material provision at a particular school. Fuller, (1985) concluded: " A good deal of evidence now suggests that material factors in schools, such as more text books or writing materials exercise more influence on achievement in the Third world than in industrialized countries."

In addition Nyagura's findings are also in agreement with this research.

Nyagura, (1991) found that "student achievement was higher when schools had a greater availability of textbooks, a larger proportion of trained teachers and teachers who had taught at that school a longer period of time." This suggests that raising the portifolio of trained teachers and more importantly improving the proving of textbooks and providing incentives for teachers to remain in the same school for a reasonable period of time are promising investment options to boost student achievement.

In LASs the majority of teachers were not trained in Physics Education but qualified in other subject areas. It was learnt that the shortage of qualified teachers of Physics in High Schools had forced schools to use anyone willing to teach Physics. This is in line with the findings of Kayungwa (2002) which stated: " Administrators often resort to hiring anyone that they can find. Teachers are assigned to teach out-of-field courses in shortage areas such as Mathematics and Science. Many legislators see nothing wrong with hiring anyone with a Bachelors degree. Such Policy-makers still have the view of teaching as a simple rote activity that anyone can do, no special preparation required." This study's findings are in agreement with those of Kayungwa (2002) , regarding qualifications, the majority of Headteachers preferred degree holders to Diploma holders and said that " the higher the qualification, the better the teaching."

A majority 83% (N=10) of School Administrators in the sample blamed a lack of qualified teachers for the high failure of students in Physics. Maliwatu (2006) quoting Sauders and Rivers (1996) argues that the single most important factor affecting student achievement is teachers, and the effects of teachers on student achievement are both addictive and cumulative.

On conditions of service, 76% of the respondents indicated that the factor concerning low morale and poor conditions of service for the teachers of Physics was considered as the major contributor to poor performance. Poor working conditions had greatly contributed to the lack of many Physics Graduate teachers in high schools. Teachers of Physics suffered from low morale due to being over worked and from low salaries compared to working in the industry. The status of the teachers and their standing in the community, as well as purchasing power, had been greatly eroded over the past years,

consequently they were not motivated to try to alleviate the situation of poor performance.

The findings of this study showed that Private High Schools had slightly better conditions of service for teachers of Physics than GRZ or GA High Schools. The Headteachers in GRZ High Schools lamented that it was difficult to retain properly teachers in class because of poor conditions of service.

The research revealed that laboratory assistants were available in 67% (N=4) of HAS and none (0%) in the LAS. Kostyuk (2002:134) adds: " Lack of laboratory assistants also contributed to teachers not involving pupils in practical work, as it meant more work for a teacher who was already over burdened."

The findings of this study revealed that in two HASs only pupils that performed extremely well in Environmental Science at Grade 9 level are allowed to take Physics at senior level. It was further revealed in the same schools that only Grade 12 pupils that perform well in the continuous assessment are allowed to seat for Physics examinations. In LASs this practice was non-existent. This finding is consistent with Riddell and Nyagura, (1991) and Nyagura (1996) who stated that : " Variation of student achievement is due to a school's failure to control the selection of students into the school on the basis of prior academic achievement. A school that only accepts a certain caliber of student clearly shows what is expected of them. If they do not achieve what is expected of them they are discarded. This is done by either being made to repeat or by expulsion."

The studies by Nyagura (1996) adds that: "high performing schools insisted on quality on admission and further screened students, only promoting those whom they deemed ready to take the final examinations, thus manipulation school performance."

On measures proposed by Heads of Science Departments (HODs) to be put in place in order to improve performance of pupils, the following were mentioned

(a) teaching the subject through practical sessions

(b) teaching the subject through practical sessions

(c) teachers prepare worksheets for pupils.

The findings showed that 67% (N=8) of the HODs said that regular departmental meetings were necessary to ensure that the proposed measures continue being carried out. It was further mentioned that departmental meetings must analyze the situation on the performance of pupils in Physics, and then agree on a concrete plan and course of action to improve the attitude of both pupils and teachers. This finding is in agreement with Oakes (1989) argues that: " Some of the main features characterizing good schools are collaborative planning, intellectual sharing, and teamwork."

On twining High Schools with better resourced schools that are within and out of the country for support in Physics learning and teaching materials. 58% (N=7) of the teachers of Physics suggested that they could partner with Engineers and Physicists from the industry in the teaching of Physics and making it more practical in everyday life. This finding is in line with MoE (1996) which proposed that partnerships between schools and other sectors of the economy must be encouraged.

Lastly, all respondents mentioned Physics to be a vital subject necessary for everyday life.

CHAPTER 6: CONCLUSIONS AND RECOMMENDATIONS

6.1 Preview

This chapter comprises two sections. Section one is about implications of the study while section two is based on conclusions and recommendations of the study.

6.2 Section One- Implications of the Study

This section discusses the implications that the research findings could have on the poor performance in Physics. This study is significant because, by informing authorities, it may provide directions for present and future policy makers, teachers of Physics, school headteachers, heads of science departments and Physics classroom environments in high schools. To be more specific, four levels of significance of this study can be drawn. The first is for the researcher as a teacher of Science, the second is for policy makers, the third is for school administrators and the fourth is for teachers of Physics. These implications are explained in sections 6.2.1, 6.2.2, 6.2.3 and 6.2.4, respectively.

6.2.1 Implications for the Researcher

From a personal perspective, this study made it possible for the researcher to visit a sample of high schools and Physics laboratories and gave him an insight into the Physics teaching practices in these schools.

Through observing Physics laboratories, classrooms and holding discussions with school headteachers and heads of science departments, the researcher was able to recognize and document the complexity and difficulties of responding to the poor performance in Physics. This awareness helped and enabled the

researcher to better understand the factors that affected poor performance in Physics in high schools on the Copperbelt.

6.2.2 Implications for Policy Makers

For policy makers, this study also had significance in that the research provided evidence of how high schools were responding to poor performance in Physics. The findings suggested that the disparities, in terms of the school's infrastructure, Physics curriculum implementation, school headteachers' perceptions, heads of science departments' views on poor performance could be used as a point of departure for improvement. Policy makers needed to give particular attention to sourcing for adequate funding for high schools so that Physics as a subject did not lag behind.

6.2.3 Implications for School Administrators

The findings provided significant evidence that school administrators needed to take into consideration. The research findings suggested that there were gaps between teachers' perceptions of the actual and the preferred working environment. The findings might help the school administrators to run the schools so that teachers of Physics' preferred working environments could be accommodated. It was expected that by having preferred working environments teachers of Physics might improve their teaching practices and in turn help pupils to learn better. Furthermore, the findings informed school administrators about the status of how the Physics curriculum was being implemented. School administrators might use these as starting points for school improvement.

6.2.4 Implications for Teachers of Physics

Similarly, the findings also suggest that there were discrepancies between school headteachers' perceptions of the poor performance in Physics and that of the teachers of Physics. The findings also brought to light some Physics teaching practices which might be used to improve achievement in Physics examinations.

6.3 Section Two: Conclusions, Recommendations and Possibilities for Future Research

In concluding this study, recommendations for improvement of the performance of pupils in Physics and suggestions for possible future research are offered. The discussion above was based on a small sample, but highlights serious problems that could lead to a crisis in Physics Education on the Copperbelt.

6.3.1 Conclusions

The poor performance in Physics reflected the handicap the nation was confronted with in having adequate number of qualified teachers of Physics, adequate Physics instructional materials in schools, and adequately supplied Physics laboratories. It must be emphasized that unless a headteacher can organize his/her administrative work to allow himself/herself time to deal with staff business and general organizing of the school duties, he/she will find himself/herself in a perpetual muddle of unfinished jobs and unsatisfactory situations. Unfortunately, this state of affairs first affected the staff, which became discontented and uncooperative. This feeling amongst the staff was quickly passed on to the pupils and resulted in difficulties in all classes. 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 improved the situation. An administrator should each day check around the school and where things are going well, he/she must be ready to praise the efforts made by the teacher. Where something is not being done properly he/she must advise and demonstrate how it should be done.

This research represented a first step at trying to understand how high schools on the Copperbelt had responded to the poor performance of pupils in Physics examinations. A number of causes of the poor performance were identified from low and high performing schools and the measures schools put in place were outlined. Among the issues revealed by the study was that a number of school headteachers (67%) did not think that poor performance was their problem but that for the Science department and the teachers of Physics in the school. Therefore we can make a conclusion that one of the factors contributing to the poor achievement of pupils in O-level Physics examinations is poor management by School Administrators.

6.3.2 Recommendations and Possibilities for Future Research

(a) Recommendations

This study has shown the extent to which the school administrators in 12 selected high schools on the Copperbelt responded to poor performance in Physics examinations. The study also revealed the state of Physics classrooms and Physics laboratories. The recommendations put forward included:

(i) School administrators need to conduct assessment of the views held by teachers of Physics on the school working environments.

(ii) The results could inform stakeholders how to help teachers of Physics develop a better school atmosphere which would enable the pupils learn better.

(iii) Funds must be solicited specifically for employing and/or promoting teachers of Physics.

(iv) High schools that offer Physics should be twinned with other well funded high schools that might be locally based or based out of the country.

(v) The private industry must partner with the Ministry of Education in supplying Physics instructional materials to high schools

(vi) Teachers of Physics must be paid higher salaries in form of a laboratory allowance where laboratory assistants were not available.

(vii) The Ministry of Education working in corroboration with the Examinations Council of Zambia need to create an examination panel to manage and control Physics examinations.

(viii) The school headteachers and heads of science departments in schools which offer Physics as a subject should be given an orientation designed to teach them how the could effectively administer Physics in the school.

(b) Suggestion for Possible Future Research

This study has broken new ground in investigating how school administrators are responding to poor performance in Physics examinations in Zambian high schools. Although this study has produced several meaningful outcomes, there are suggestions for future research.

The suggestions include:

(i) Replication of the study within the Copperbelt Province but using larger samples and the replication of the study in other provinces.

(ii) A replication of this study with a larger sample involving the pupils that take Physics may lead to a more complete and upgraded provision of Physics Education in Zambia. The pupils might bring up views which this study might have not covered.

(iii) It would be worthwhile to replicate this study in other provinces in Zambia as a comparative study. The more studies are conducted, the more results are generated and the better and more complete a picture of Physics Education in Zambia is obtained.

(iv) Finally, this study suggests further research in the possibilities of offering specialized training for school administrators in charge of high schools which offer Physics as a subject.

BIBLIOGRAPHY

Aoki, T. (1985), "Interests, Knowledge and Attitude: Alternative approaches to Curriculum evaluation", **Journal of Curriculum Theorizing**: 6 (4). 27-44

Balderson, J.H. (1975). "Principal Power Bases: Some Observations", **The Canadian Administrator**: 14(7), 1-5

Belcher, J. (2003). **For Active Learning**, London: Elsevier Ltd.

Bame, K.N. (1991). **Teacher Motivation and Retention in Ghana.** Ghana University Press, Accra.

Banda, N.H. (2002) **In- Service Training Opportunities Among Secondary School Teachers in Private Schools**, Master's Dissertation, University of Zambia, Lusaka.

Best, J. (1970). **Doing Your Research Project**: Guide For First Time Researchers In Education and Social Science, Buckingham: Open University.

Blum, R.E. (1990). **Effective Schooling Practices**: **A Research Synthesis 1990 Update**. North West Regional Educational Laboratory, Portland, Oregon.

Carrol, A.J. (1973). **65 per Cent Failed**, ZASE Bulletin, vol 4(1).17-28

Chelu, F.K. (1995). **The Training and Utilization of Teachers in Zambia**, Lusaka: MoE.

Chibesakunda, A. (1983). **Problems of Teaching Science in Zambia with Particular Reference to Language**: An unpublished MA (Science Education) dissertation, London, Chelsea College.

Chonjo, P. (1995).Science and Mathematics Education in Tanzania, **Improving Science and Mathematics Teaching in Southern Africa**, Nairobi: Leao de Feiter.

Cohen, M. (1981). "Effective Schools: What the Research Says", **Today Education**: 70 (2): 58-61.

Cohen, M., Manion, L. and Morrison, K. (2003). **Research Methods in Education,** (5th Ed). London: TJ International Ltd.

Curriculum Development Center. (2000). **Physics High School Syllabus**, Lusaka : Curriculum Development Centre.

Dadey, A and Harber, C (1991), **Training and Professional Support for Headship in Africa**. Commonwealth Secretariat, London.

Darling-Hammond, L.(2000) "**Teacher Quality and Student Achievement: A review of State Policy evidence.**" Education Policy Analysis Archives. 8(1) (http: epaa.asu.edu/eppa/v8nl)

Doidge, M. (1997). How Readable is your Biology textbook? Can you be sure? **Proceedings of Conference of the South African Association of Research in Mathematics and Science Education**. Johannesburg, South Africa.

E.C.Z. (1998). **School Certificate and G.C.E Examiners' Report for October/ November 1996/1997 Examination**, Lusaka: E.C.Z.

E.C.Z. (2001). **School Certificate and G.C.E Examiners' Reports: Physical Science 2000 Examinations**. Lusaka: E.C.Z

E.C.Z. (2004). **School Certificate & GCE Examiners' Report**: October/November 2002/2003 Examinations. Government Printers, Lusaka. Zambia.

Fisher A, Laing J.E, Stoeckel J.E and Townsend J.W (1991), **Handbook For Family Planning Operations Research Design**, Population Council, New York.

Fuller, B. (1985). '**Raising School Quality in Developing Countries**' in Kelly, M.J. (1991) Education in a Declining Economy, Washington, DC: The World Bank.

Fuller, B. (1987). What School Factors raise Achievement in the Third World? **Review Of Educational Research**, 57, 255-292.

Gall, M.Walter, R and Gall, J.P. (1996). **Educational Research: An Introduction**, (6thEd). New York: Longman Publishers.

Gilbert, J.K and Swift, D.J. (1985). Towards a Lakatosian analysis of the Piagetian and alternative conceptions research programs, **Science Education**; (69):681- 696.

Goma, L.H.K. (1984).**The African University: Issues and Perspectives**, Lusaka, Kenneth Kaunda Foundation.

Grayson, D. (2001), **A Comparison of Mathematics and Science High School Teachers' Attitudes in Japan and South Africa**, Oxford University Press.

Guindiza, D. (1983). **The Role of African Academics in the Development of Africa**, 4th Seminar ZPWPA, Eastern, Central and Southern Region, Lusaka, Zambia. 4th – 6th March, 1983.

Hall, R. (1963). "The Concept of Bureaucracy: An Empirical Assessment;" **The American Journal of Sociology**: 69(1): 201-208.

Haambokoma,C.,Nkhata,B.,Kostyuk,V.S.,Chabalenlula,V.,Mbewe,S.,Tabakamulamu,M ., Ndhlovu,Z.B. ,Mashanga,R and Nthani,D. (2002).**Strengthening of Mathematics and Science Education in Zambian Secondary School**: Baseline Study Report, Lusaka. JICA/MOE.

Head, J. (1985). **The Personal Response to Science**, London, Cambridge University. Press.

Jamison,T., Scarle ,B., Galda,K. & Keyneman, S.P. (1981). Improving Elementary Mathematics Education in Nicaragua: An experimental Study of the Impact of Textbooks and radio on Achievement. **Journal of Educational Psychology**,73, 556-567.

Jumbe, J and Tindi, E. (1998). **Report on Physics Teachers needs: For African Development Bank Education II Project (ZEPIU)**, Lusaka, Zambia.

Kayungwa, L.J.(2002) **Qualities of an Effective Teacher as Perceived by Grade 12 Pupils and Teachers in Selected Secondary Schools in Lusaka**. Master's Dissertation, University of Zambia, Lusaka.

Kayter, J and Titheridge, D. (1990). **Zambia: Maths and Science Teaching Consultant Group**. Consultant Report: MOE

Kelly, M.J. (1991). **Education in a Declining Economy**: The Case of Zambia 1979-1985, Washington D.C: The World Bank.

Kelly, M.J. (1996). **Origins and Development of Education in Zambia**: Lusaka, University of Zambia.

Keyneman, S.P. & Loxey, W. (1983). The Effect of Primary School Quality on Academic Achievement across Twenty-nine High and Low income Countries. **American Journal of Sociology**, 88, 1162-1194.

Kochhar, S.K. (2004), **Secondary School Administration,** Sterling Publishers Private Limited, New Delhi.

Kool, M and Stoll, C. (1993), **Science Education in Developing Countries: From Theory to Practice**, A workshop discussion paper at a Conference held in Jerusalem Israel.

Kostyuk, V.S. (1998). **Physics 10. Pupil's Book**. Urania Ltd, Zambia.

Kostyuk, V.S. (2002), Findings and Discussion: In Haambokoma, C. et al. **Strengthening Of Mathematics Science Education in Zambian Secondary Schools:** Baseline Study Report. JICA/ MoE. Lusaka. Pp. 124-146.

Kostyuk, V.S. (2004). "Background and Professional Qualification of Secondary School Physics Teachers in Zambia;" **Zango**: 24(14):85-94, Lusaka; UNZA Press.

Kostyuk, V.S. (2006). **Availability of Human and Material Resources for the Teaching of Physics in Zambian Secondary Schools.** (To be published in Zambian Journal of Education, UNZA)

Lambert, K. (1975). "The Role of Head of Departments in Schools" **Education Administration Bulletin**: 3(2):27-37.

Leedy, D.P. and Ormrod, E.J. (2001) **Practical Research : Planning and Design**, New Jersey: Merrill Prentice Hall.

Lewin, K. (1990) **International Perspectives in the Development of Science Education**: Food for thought. Studies in Science Education (18) 1- 23.

Lungwangwa, G and Mwikisa, C.N. (1998). **Education Indicators, Costs, and Determinants of Primary School Effectiveness in Zambia**. Ministry of Education, Lusaka.

Mac Donald, M.A and Rogan, J.M. (1988). Innovation in South Africa Science Education (Part 1); Science teaching Observed; **Science Education**: 72(2):225-236.

Macfarlane, I.G, Makhurane P.M, Matos, N and Merkus, R. (1990). **Strengthening Mathematics and Science Education Through Regional Cooperation**. Report of RTC/EC Consultancy Center for Development Cooperation Services, Free University Amsterdam.

Magagula, C.M. (1991). **Training Needs o f High School Head Teachers of Swaziland**, Ed Dissertation, University of Toronto.

Magagula, C.M. (2001). **Head Teachers' Perceptions of Power Bases: An Empirical Study about Swaziland**. Swaziland, University of Swaziland.

Malcom, M. (2002). **Proceedings of the 10th Annual Conference of the Southern African Association for Research in Mathematics, Science and Technology Education**. University of Natal, Durban: 22-26th January.

Maliwatu, J. (2006). **A Comparative Study of Classroom Practice of Graduate and Non-Graduate Teachers of Mathematics in Selected High School of Copperbelt Province.** Masters of Education Dissertation, University of Zambia.

Manchishi, P.C. (2001). **The Growth of Teacher Education in Zambia since 1883,** (Unpublished Manuscript, University of Zambia.)

Manchishi, P.C. (2002). **The Provision of Teacher Education in Zambia.** (Unpublished Manuscript, University of Zambia.)

Maqutu, T.Z. (2002), Explaining Achievement at O- Level Physical Science Examinations: A Cross- Analysis of Four Schools in Lesotho. **Proceedings of the 10th Annual Conference of the Southern African Association for Research in Mathematics, Science and Technology Education.** Durban, pp.243-250.

Maqutu, T.Z. (2003). Explaining success in O-level physical science in Lesotho: A Survey of physical science teachers, **African Journal of Research in Science, Mathematics and Technology Education**: 7(2) 97-107.

Marland, M. (1977). **Head of Department**. London: Heinemann Publishing.

Mathew, J.C. (1973).**School Certificate Results in Zambia, Report to Ministry of Education**, Lusaka, Government Printers.

Mbogua, P. (1970). Administrative Duties of Headteachers, **Kenya Education Journal**; 5 (1) 3-5.

Miller, R and Driver, R. (1987). Beyond Processes, **Studies in Science Education**; 14, 33-62.

Ministry of Education. (1977). **Educational Reforms Proposals and Recommendations**, Lusaka. Government Printers.

Ministry of Education. (1992). **Focus on Learning**. Lusaka. Government Printers.

Ministry of Education. (1996). **Educating our Future**; *National Policy on Education.* Lusaka: Government Printers.

MoE. (1999). **Strategic Plan for Teacher Education**: *2000-2015*, Lusaka: Government Printers.

Ministry of Education. (2001). **Guidelines for Human Resource Development and Promotion in the Ministry of Education**, Lusaka: Zambia.

Ministry of Education. (2002).**Strategic Plan 2003-2007**: Situational Analysis, MOE. Lusaka.

Ministry of Finance and National Planning. (2002). **Transitional National Development Plan 2002-2005**; Planning and Economic Management Development. Lusaka: Government Printers.

Ministry of Science, Technology and Vocational Training (1994). **National Policy on Science and Technology**, Lusaka; Government Printers.

Mouly, G.J. (1963). **The Science of Educational Research**. New York: American Book Company.

Muchelemba, V. (2001). **Pupils', Teachers' and Community's Views about the Management Effectiveness of Female and Male Public Secondary School Headteachers in Lusaka District**. Master's Dissertation, University of Zambia, Lusaka.

Mulenga, M.A. (2003). **Factors Affecting the Utilization of Industrial Arts Departments in Schools: A Study of Selected Secondary Schools in Lusaka Province, Zambia.** (Unpublished MED. Administration Dissertation), Lusaka. Zambia.

Muwanga-Zake, J.F .(2000). Is Science Education in South Africa in a Crisis? The Eastern Cape Experience; **Journal of the Southern African Association for Research in Mathematics, Science and Technology Education**: 4(1):1-11.

Mwanakatwe, J.M. (1968). **The Growth of Education in Zambia since Independence.** Lusaka: Oxford University Press.

Mwase, E.T et al (1999). **Participation and Performance of Girls in Science,** Mathematics and Technical Subjects: Zambia's Case Study, A Research Report for FEMSA, Zambia.

Mwanza, P (2004) **Teacher Perception of School Management Practices and their Influence on Teacher Performance in Selected High Schools of Lusaka.** (Unpublished M.ED Dissertation), University of Zambia, Lusaka.

Nyagura, L.M. (1991). **Multi-level Investigations of Effects of Schools, Classrooms and Students' Characteristics on Academic Achievement in Zimbabwe's Primary School***s*. Harare, HRRC, University of Zimababwe.

Oakes, J. (1989). **What Educational Indicators? The Case for Assessing the School Context. Educational Evaluation and Policy Analysis**. Summer 1989 Vol. 11 (2) pp 181-199.

Ogunniyi, M.B. (1986). **Two Decades of Science Education in Africa, Science Education**; 70 (2):111-112.

Ogunnyi, M.B. (1996). Science, Technology and Mathematics: The problem of developing Critical human capital in Africa. **International Journal of Science Education**; 18(3):267-284.

Ogunniyi,M.B.(ed)(1998). Promoting Public Understanding of Science and Technology in Southern Africa; **Proceedings of a Southern African Conference**, Cape Town, 4-7 December 1996.pp 1-3

O'Leorg, J. (1997). **A Study of School Effectiveness in the Southern Province of Zambia.** PhD Thesis, National University of Ireland, Belfast.

Osborne,J.F. (1996). Beyond Constructivism, **Science Education**; 80(1):53-82.

Paras, J. (2001). Crisis in Mathematics Education Student Failure; Challenges and Possibilities. University of Natal: **South African Journal of Higher Education**; 15(3)66.

Rivkin, S.G, Hamushek, E.A and Kain, J.F. (1998). **Teachers, Schools and Academic Achievement. National Bureau of Economic Research.** Working paper, No. 6691.

Rief, F. (1985). Acquiring an Effective Understanding of Scientific Concepts, West, L. & Pines, A (eds), **Cognitive Structure and Conceptual Change.** (pp:135-151). Orlando: FL Academic Press.

Robson,C.(1993). **Real World Research; A Resource for Social Scientists And Practioner Researchers**. Oxford: Blackwell.

Rugumayo,E.B.(1978). **An investigation of the Resources and materials for the Teaching of Biology in Zambian Secondary Schools**. Lusaka: University of Zambia.

Salkind.J.N. (2003). **Exploring Research**, Kansas: University of Kansas Pearson Education Inc.

Saunders, W. and Rivers, J. (1996). **Cumulative and Residual Effects of Teachers on Future Student Academic Achievement**, Vuoxville, TN: University of Tennessee, Value-Added Research and Assessment Centre.

Schmuck, R and Runkel, P. (1977). **The Role of the Principal in Teacher Evaluation in Secondary Schools**. Edmonton: Alberta Planning Services.

Shanyinde, P. et al (2001). **Conference Report; Regional Conference for Mathematics and science Education in Secondary schools. Enhancing Classroom Activities for Quality Teaching and Learning in Eastern, Central and Southern Africa Region** *(19th -22nd February 2001)*. Held at Kenya Science Teacher's College, Nairobi, Kenya.

Snelson, P.D. (1974). **Education Development in Northern Rhodesia 1883-1945**. Lusaka: Kenneth Kaunda Foundation.

Stannard,D. (1970). **Secondary Level Teachers: Supply and demand in Zambia**; *Lusaka:* University of Zambia.

Till, W.V. (1971) (ed). **Curriculum; Quest for Relevance**. New York: Houghton Muffin Company.

Travers, M.W.R. (1999). **An Introduction to Educational Research**, Western Michigan University, Macmillan Publishing Company.

Wall, W.D. (1962). **Failure in Schools**, UNESCO Institute for Education, Hambury.

Wayne.A .(1987). **Looking at Effective Schools**. Lexington, Mass: D.C Health and Company.

Wessel, W. (2004). **High School Physics** :A Study of Student Teacher Interaction, SSTA Research Center Report # 99-04.

APPENDIX I

RESPONSE OF SCHOOL ADMINISTRATORS TO POOR PERFORMANCE IN PHYSICS EXAMINATIONS: A CASE OF SELECTED HIGH SCHOOLS IN THE COPPERBELT PROVINCE.

SEMI-STRUCTURED INTERVIEW (SSIS) SCHEDULE FOR HEAD TEACHERS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND POLICY STUDIES

QUESTIONNAIRE No: _____

IDENTIFICATION DATA (FOR OFFICIAL USE)

District: _____

School: _____

Date of Interview: _____

Time of Interview: Start: _____ End: _____

Name of Interviewer: _____

Sex of Respondent: _____

Title of Respondent: _____

For official use Only

PART ONE

Background Data

Q1. What is your highest qualification?

1. Diploma ( ) [ ]
2. Advanced Diploma ( ) [ ]
3. Bachelors Degree ( ) [ ]
4. Masters Degree ( ) [ ]
5. Other (specify) _____ [ ]

What is your subject of specialization : _____ [ ]

Q2. How long have you served as headteacher? _____ [ ]

Q3. How long have you worked for this school? _____ [ ]

Q4. How many teachers of Physics do you have at your school? _____ [ ]

1. One ( )
2. Two ( )
3. Three ( )
4. Four ( )
5. Five ( )
6. More than five ( ) [ ]

Q5. Is it your first time to head a school which offers Physics as a subject?

1. Yes ( ) 2. No ( ) [ ]

Q6. How was the Head of Science Department appointed?

1. Recommendation ( )
2. Advertisement ( ) [ ]

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PART TWO – OBJECTIVES

SECTION ONE

Measures put in place as a response to the poor performance in Physics Examinations.

Q7. Was the HOD of science given orientation/ training after he/ she Was appointed?

1. Yes ( ) 2. No ( ) 3. I was not there ( ) [ ]

If the answer is YES go to Q8.

If the answer is NO go to Q9a.

Q8. What kind of orientation was given?

1. Administration and Supervision ( )
2. General Management of department ( )
3. Specific instructions on management of the science department ( )
4. Other (specify) _____ [ ]

Q9a. Who provides materials for use in the teaching of Physics?

1. School through PTA/Board ( )
2. The District Education Office ( )
3. The Provincial Education Office ( )
4. The Ministry of Education ( )
5. Both School and Ministry of Education ( )
6. Other (specify) _____ [ ]

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Q9b. How often are these materials provided?

1. Once per term ( )
2. Twice per term ( )
3. Once per year ( )
4. Twice per year ( )
5. None ( ) [ ]

Q10. How often do you visit the science department and Physics Laboratories?

1. Every day ( )
2. Once per week ( )
3. Twice per week ( )
4. Rarely ( ) [ ]

Q11a. What problems do heads of science department find in the running of Physics as a subject?

1. _____
2. _____
3. _____
4. _____ [ ]

Q11b. What have you done to solve the problems listed in Q11a above?

1. _____
2. _____
3. _____ [ ]

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Q11c. Do you think the problems mentioned in Q11a contribute to the poor performance in Physics examinations in your school?

1. Yes ( ) 2. No ( ) [ ]

Q11d. Mention some factors you know which contribute to the poor performance in Physics examinations in your school.

1. _____
2. _____
3. _____ [ ]

Q12a. In your view, do you think it is necessary to provide headteachers with some form of training on supervision of science departments?

1. Yes ( ) 2. No ( ) [ ]

Q12b. If your answer in Q12a is YES, why do you think it is necessary?

1. _____
2. _____
3. _____ [ ]

Q12c. If your answer in Q12a is NO, why do you think it is NOT necessary?

1. _____
2. _____
3. _____ [ ]

How are pupils selected for 'O' level Physics classes?

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SECTION TWO

VIEWS HELD BY HEAD TEACHERS ABOUT THE POOR PERFORMANCE IN 'O' LEVEL PHYSICS EXAMINATIONS.

Q13a. Do you think the failure rate in Physics examinations is a source of concern for the schools?

1. Yes ( ) 2. No ( ) [ ]

Q13b. If the answer is YES to Q13a, list ways in which the poor performance is affecting Physics education in your school;

1. _____
2. _____
3. _____ [ ]

Q14a. Do you hold any workshops for Physics teachers at your school?

1. Yes ( ) 2. No ( ) [ ]

If the answer is YES, go to Q14b.

Q14b. Has any of these workshops focused on the poor performance in Physics Examinations?

1. Yes ( ) 2. No ( ) [ ]

Q14c. Mention some strategies you have put in place as a response to improve performance in Physics examination:

1. _____
2. _____
3. _____
4. _____ [ ]

For official use Only

Q15a. Do you easily access Physics teaching and learning for purchase.

1. Yes ( ) 2. No ( )

Q15b. Comment on your answer to Q15a;

1. _____

2. _____ [ ]

Q16a. Do you have Physics practicals being conducted during physics Lessons?

1. Yes ( ) 2. No ( ) [ ]

Q16b. If the answer to Q16a is YES, how much money is spent on them per term?

_____

For official use Only

Q17. What do you think is the major cause of the poor performance in 'O' level Physics examinations?

_____ [ ]

_____

SECTION THREE

INFLUENCE OF LOCATION OF SCHOOL AND THE POOR PERFORMANCE IN 'O' LEVEL PHYSICS EXAMINATIONS.

Q18a. Does the location of the school affect the purchase of Physics materials.

1. Yes ( ) 2. No ( ) [ ]

Q18b. Comment on your answer to Q19a;

1. _____

2. _____ [ ]

Q19a. Have you ever experienced theft of Physics materials and apparatus?

1. Yes ( ) 2. No ( ) [ ]

Q19b. What do you think could have been the reason for the theft that occurred?

1. Physics store room was not burglar proofed ( )
2. The school is built in an unsafe place ( )
3. The was no watchman ( )
4. Other (specify) _____ [ ]

For official use Only

Q20a. Is it easy to replace worn out apparatus, materials and equipment Considering the location of the school?

1. Yes ( ) 2. No ( ) [ ]

Q20b. If the answer to Q21a is YES, give reasons;

1. _____

2. _____ [ ]

Q20c. If the answer to Q21a is NO, give reasons;

1. _____

2. _____ [ ]

END OF INTERVIEW

I thank you very much for your participation.

APPENDIX II

RESPONSE OF SCHOOL ADMINISTRATORS TO POOR PERFORMANCE IN PHYSICS EXAMINATIONS: A CASE OF SELECTED HIGH SCHOOLS IN THE COPPERBELT PROVINCE.

SEMI-STRUCTURED INTERVIEW SCHEDULE (SSIS) FOR HEADS OF SCIENCE DEPARTMENT

THE UNIVERSITY OF ZAMBIA
DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND POLICY STUDIES

Questionnaire No: _____

IDENTIFICATION DATA (FOR OFFICIAL USE)

District: _____

School: _____

Date of Interview: _____

Time of Interview: Start: _____ End: _____

Name of Interviewer: _____

Name of Respondent: _____

Sex of Respondent: _____

Title of Respondent: _____

Checked by: _____

Date checked: _____

Date entered: _____

For official use Only

PART ONE

BACKGROUND DATA

Q1. How long have you served as Head of Department? _____ [ ]

Q2. How long have you worked at this school? _____ [ ]

Q3a. What is your highest educational qualification?

1. Certificate ( )
2. Diploma ( )
3. Advanced Diploma ( )
4. Bachelors Degree ( )
5. Masters Degree ( )
6. Other (specify) _____ [ ]

Q3b. What is your subject of specialization ? _____ [ ]

Q4a. How many teachers are there in your Department?

1. One ( )
2. Two ( )
3. Three ( )
4. Four ( )
5. Five ( )
6. More than five ( ) [ ]

Q4b. How many teachers of Physics are there in your Department?

1. One ( )
2. Two ( )
3. Three ( )
4. Four ( )
5. Five ( )
6. More than five ( ) [ ]

For official use Only

Q5. Is it your first time to head a Science Department?

1. Yes ( ) 2. No ( ) [ ]

Q6. How were you appointed as head of Department?

1. By recommendation ( )
2. By advertisement ( ) [ ]

PART TWO. OBJECTIVES

SECTION ONE

Measures put in place as a response to the Poor Performance in Physics.

Q7a. Where you given special training or orientation after you were appointed as Head of Department?

1. Yes ( ) 2. No ( ) [ ]

Q7b. If the answer is NO to question 7a, explain how you manage the Department?

1. _____
2. _____ [ ]

For official use Only

Q7c. List down the courses (subjects) you took during your training.

INITIAL TRAINING	2ND TRAINING	3RD TRAINING

[ ]

Q8a. Do you have Physics laboratories?

1.Yes ( )

2. No ( ) [ ]

Q8b. How well stocked is the Physics storeroom with materials and apparatus for teaching Physics and practicals?

1. Very well stocked ( )
2. Well stocked ( )
3. Fairly stocked ( )
4. Poorly stocked ( )

[ ]

For official use Only

Q8c. Is it possible to teach Physics without materials and apparatus for practicals?

1. Yes ( ) 2. No ( ) [ ]

Q8d. Do teachers have access to Physics teaching and learning aids?

1. Yes ( ) 2. No ( ) [ ]

Q8e. If the answer is NO to Q8d, give reasons;

1. _____

2. _____ [ ]

Q8f. How do you replace worn out materials and apparatus?

1. _____

2. _____ [ ]

Q8g. Do you have a person employed as a laboratory assistant?

1. Yes ( ) 2. No ( ) [ ]

Q8h. If the answer is NO to question 8g, give reasons;

1. _____

2. _____ [ ]

Q9a. Do you involve teachers in decision making about matters concerning the department?

1. Yes ( ) 2. No ( ) [ ]

Q9b. If the answer is NO, why do you not involve them?

1. _____ [ ]

For official use Only

2. _____

Q10a. Do you conduct departmental meetings?

1. Yes ( ) 2. No ( ) [ ]

Q10b. If the answer is YES, how many times do you conduct meetings per term?

1. Once ( )
2. Twice ( )
3. Three ( )
4. More than three ( )

[ ]

Q11. How often do you conduct stock taking per term?

1. Once ( )
2. Twice ( )
3. Three ( )
4. More than three ( )

[ ]

Q12a. Do you conduct lesson observations to your Physics teachers?

1. Yes ( ) 2. No ( ) [ ]

Q12b. If the answer to Q12a is NO, give reasons;

1. _____
2. _____ [ ]

Q12c. If your answer to Q12a is YES, how often do you conduct them?

1. Once a week ( )
2. Once a month ( )
3. Once a term ( )
4. Other (specify) _____ [ ]

For official use Only

Q12d. What do you do to a teacher found wanting?

1. _____
2. _____

[ ]

Q13a. Do you think the performance in Physics examinations in your school is a source of concern?

1. Yes ( ) 2. No ( ) [ ]

Q13b. If your answer to Q13a is YES, give reasons for your answer?

1. _____
2. _____
3. _____ [ ]

Q13c. What factors contribute to the poor performance in physics?

1. _____
2. _____
3. _____ [ ]

Q13d. What measures have you put in place to help reduce the failure rate in physics examinations in your school?

1. _____
2. _____
3. _____ [ ]

Q13e. Does the school administration support these measures put in place?

1. Yes ( ) 2. No ( ) [ ]

For official use Only

Q13f. If the answer to Q13e is YES, explain how?

1. _____
2. _____
3. _____ [ ]

Q13g. If the answer to Q13e is NO, explain why?

1. _____
2. _____
3. _____ [ ]

SECTION TWO

LOCATION OF THE SCHOOL AND ITS INFLUENCE ON THE HIGH FAILURE RATE IN PHYSICS EXAMINATIONS.

Q14a. Does the geographical location of the school affect the supply of procurement of Physics teaching and learning materials?

1. Yes ( ) 2. No ( ) [ ]

Q14b. What makes it easy / difficult to obtain these materials?

1. _____
2. _____ [ ]

Q15a. Have you ever experienced any loss of Physics materials and apparatus to theft at your school?

1. Yes ( ) 2. No ( ) [ ]

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Q15b. What do you think could have been the reason for the theft that occurred in your Department?

1. Storeroom was not burglar proofed ( )
2. The school is built in an unsafe place ( )
3. There were no watchmen ( )

[ ]

Q16. How easy is it to replace worn out apparatus, broken equipment considering the location of the school?

1. _____
2. _____
3. _____

[ ]

END OF QUESTIONNAIRE

THANK YOU VERY MUCH FOR YOUR COOPERATION.

APPENDIX III

RESPONSE OF ADMINISTRATORS TO POOR PERFORMANCE IN PHYSICS EXAMINATIONS: A CASE OF SELECTED HIGH SCHOOLS IN THE COPPERBELT PROVINCE.

SELF ADMINISTERED QUESTIONNAIRE (SAQ) FOR TEACHERS OF PHYSICS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND POLICY STUDIES

Questionnaire No: _____

Date: _____

INTRODUCTION:

My name is Mumba Ndashye. I am a student. This questionnaire is one of the research instruments I have developed to help me gather data for my Masters' degree dissertation at the University of Zambia. It is purely an academic exercise which is not meant to find fault in any person. The result of this research will be used for the improvement of physics education.

Please feel free and be as honest as possible in answering the questions. The information given will be treated confidentially. Do not write your name.

INSTRUCTIONS

The questionnaire comprises three parts

1. Part one deals with identification data
2. Part two deals with background data
3. Part three is based on objectives of the study

Answer all parts

The questionnaire requires you to either tick (√) or supply a short answer.

PART ONE: IDENTIFICATION DATA

Province: COPPERBELT

District: _____

School: _____

PART TWO: BACKGROUND DATA

	For Official Use only.
Q1a. Sex of respondent. 1. Male ( ) 2. Female ( )	[ ]
Q1b. How old are you? _____	[ ]
Q2. How long have you served as a teacher? _____	[ ]

For Official use Only

Q3. What is your qualification?

1. Masters degree ( )
2. Bachelors degree ( )
3. Advanced Diploma ( )
4. Diploma ( )
5. Skill upgrading Certificate ( )
6. Any other (specify) _____ [ ]

Q4. What subjects do you teach?

1. Physics ( )
2. Chemistry ( )
3. Biology ( )
4. Mathematics ( )
5. Physical Science ( )
6. Other (specify) _____ [ ]

Q5a. Tick (√) the Courses (Subjects) you took during teacher training.

Subject	Initial Training	2nd Training	3rd Training
Physics			
Chemistry			
Biology			
Mathematics			
Science			
Administration/ Management			

[ ]

For Official use Only

Q5b. Did you take a course in Management/Administration during your Teacher training?

1. Yes ( )
2. No ( )

[ ]

Q5c. If the answer is YES to Q5b, was it specific to your subject area?

1. Yes ( )
2. No ( )
3. N/R ( )

[ ]

Are you a member of any Science Association or Club ?

1. Yes ( ) 2. No ( ) [ ]

If the answer is Yes, give the name of the Club or Association :_____ [ ]

PART THREE:

SECTION ONE: Measures put in place in response to the Poor Performance in Physics.

Q6. Do you have Physics laboratories?

1. Yes ( ) 2. No ( ) [ ]

Q7a. Are the physics apparatus and materials available to you and your pupils for use?

1. Yes ( )
2. No ( ) [ ]

For Official use Only

Q7b. If answer in Q7a is NO, Why are they not available ?

1. _____

2._____ [ ]

Q8. How do you replace broken, lost and worn out apparatus?

1. _____

2._____ [ ]

Q9a. How often do you received physics apparatus, materials and Equipment?

1. Once a month ( )
2. Once a term ( )
3. Once a Year ( )
4. None of the above ( )

[ ]

Q9b. Do you use teaching aids during lessons?

1. Yes ( )
2. No ( )
3. N/R ( )

[ ]

Q9c. If the materials are not used during lessons explain why?

_____

_____

_____ [ ]

For Official use Only

Q9d. Where are the Physics apparatus, materials and equipment kept?

1. _____

2. _____ [ ]

Q10a. Does the school administration support Physics education in your Department?

1. Yes ( )
2. No ( ) [ ]

Q10b. If answer to Q10a is YES, what support are you given?

1. Material ( )
2. Financial ( )
3. Moral ( )
4. Other (specify) _____ [ ]
5. N/R ( )

Q10c. If answer is NO to Q10a, what is the reason?

_____

_____ [ ]

Q10d. What is the source of the Physics apparatus, materials and equipment you use for physics lessons and practical lessons?

_____

_____ [ ]

Q11a. Is the performance in physics examinations in your school a source of concern?

1. Yes ( )
2. No ( ) [ ]

For official use Only

Q11b. If the answer to Q11a is YES, what measures have been put in place to reduce the failure rate?

1. _____
2. _____
3. _____ [ ]

Q12a. Do you think the Head is managing the Department well?

1. Yes ( )
2. No ( ) [ ]

Q12b. Justify your answer if YES to Q12a.

_____
_____ [ ]

Q12c. Justify your answer if No to Q12a.

_____
_____ [ ]

Q13a. Do you conduct stocktaking?

1. Yes ( )
2. No ( ) [ ]

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Q13b. If answer to Q13a is YES, how many times in a year do you Stock take?

1. One ( )
2. Two ( )
3. Three ( )
4. Other (specify) _____ [ ]
5. N/R ( )

Q13c. If answer is NO, why don't you conduct stock taking?

_____

_____ [ ]

Q13d. If it is found that some items have been lost what happens?

1. _____
2. _____ [ ]

Q14. How often do you conduct practicals during Physics lessons?

1. Once a week ( )
2. Once a month ( )
3. Once a term ( )
4. Other (specify) _____
5. N/R ( ) [ ]

Q15. How often do you check pupils' Physics exercise books?

_____

Q16. How often does the headteacher visit your department per week?

1. One ( )
2. Two ( )
3. Three ( )
4. Other (specify) _____ [ ]

For Official use Only

SECTION II

Views held by teachers about the measures headteachers have put in place in response to the poor performance in Physics.

Q17a. Do you think Physics as a subject in your school is being managed well?

1. Yes ( )
2. No ( )

[ ]

Q17b. If your answer is YES to Q16a give reasons;

_____

_____ [ ]

Q17c. If answer is NO to Q16a give reasons;

_____

_____ [ ]

Q18. Suggest ways which could help to improve the poor performance in Physics examination;

1._____

2._____

3._____ [ ]

Q19a. In your view does the HOD of science listen to advice from others ?

1. Yes ( )
2. No ( )
3. N/A ( ) [ ]

For Official use Only

Q19b. Give reasons for your answer, If YES to Q19a,

1._____

2._____ [ ]

Q19c. If answer is NO to Q18a, give reasons;

1._____

2._____ [ ]

SECTION III

Location of the school and its influence on the poor performance in physics.

Q20a. Does the geographical location of your school affect the procurement of Physics materials?

1. Yes ( )
2. No ( ) [ ]

Q20b. If answer to Q19a is YES, state the influence it has on the organization lessons.

1._____

2._____ [ ]

Q20c. If answer to Q19a is NO, give reasons;

1._____

2._____ [ ]

For official use Only

Q20e. What problems do you encounter while conducting physics lessons in the laboratory?

_____ [ ]

_____

Q21a. Did you experience laboratory breakages and thefts?

1. Yes ( )
2. NO ( ) [ ]

Q21b. If the answer to Q20a is YES, why was it?

_____

_____ [ ]

THE END

I thank you very much for your participation.

APPENDIX IV

RESPONSE OF ADMINISTRATORS TO POOR PERFORMANCE IN PHYSICS EXAMINATIONS: A CASE OF SELECTED HIGH SCHOOLS IN THE COPPERBELT PROVINCE.

OBSERVATION (CHECKLIST) SCHEDULE FOR PHYSICS LABORATORY AND STOREROOM

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF EDUCATIONAL ADMINISTRATION AND POLICY STUDIES

DISTRICT : _____

SCHOOL : _____

DATE : _____

Look for the following things to check whether or not they are being attended to.

PHYSICS LABORATORY

ITEM	Very Good	Good	Fair	Poor	Very Poor
Care of equipment					
State of building					

AVAILABILITY OF EQUIPMENT

EQUIPMENT/APPARATUS	NUMBER	CONDITION	
		GOOD	POOR

Were the following documents available ?

a. Departmental meeting minutes.

1. Yes ( ) 2. No ( )

b. Stock books and evidence of stock taking.

1.Yes ( ) 2. No ( )

THE UNIVERSITY OF ZAMBIA
SCHOOL OF EDUCATION

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21st February, 2006

TO WHOM IT MAY CONCERN

Dear Sir/Madam

RE: FIELD WORK FOR M.ED STUDENTS

The bearer of this letter Mr./Ms. ..... MUMBA NDASHYE .....
Computer number ..... 25547844 ..... 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 the student has to complete.

We shall greatly appreciate if the necessary assistance is rendered to the student.

Thanking you always.

Yours sincerely

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

c.c. Dean, Education
Director, DRGS, UNZA

THE UNIVERSITY OF ZAMBIA
ASSISTANT DEAN (PG)
18 APR 2006
SCHOOL OF EDUCATION
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