CHAPTER ONE

INTRODUCTION

1.1 Background to the Study

This study sought to investigate the factors that have been inhibiting female learners in performing to expected standard during O-level Physics examinations despite having been accorded the same learning opportunities with their male counterparts.

The Zambian curriculum dating as far back as early the 1960s, had incorporated sciences in the education system. These sciences comprised of general science at junior secondary biology, chemistry and physics at senior level. The sciences in general were looked upon as very difficult and designed to be handled by men. With such a perceptive it was viewed that females were weak and would not manage to achieve very good grades in sciences especially in physics (Adetunde, 2008).

It has been observed that higher institutions in Zambia today, physics has become one of the most desired passed subject second to mathematics. One with good passing grades in physics is viewed as one who can easily adapt to the changes in the dynamic world. According to Lemmer (2000:34), "Mathematics, science and technology are strongly influenced by the global context and in that proficiency in these disciplines is a pre-requisite to economic success."

A mention that one has studied physics at the University of Zambia sends different messages to many and causes people to raise their eyebrows to that person, an indication that a person is not normal. As the current situation is in Zambia now only four females have satisfactorily completed physics courses at the University of Zambia. One in the School of Natural Sciences who is now a senior lecturer and a role model in the department and three from the School of Education with Physics as their teaching subject. Currently, one is pursuing a degree in education with physics as a teaching subject at The University of Zambia (UNZA).

Physics being one of the sciences taught in Zambian senior secondary schools, is not compulsory. Meaning a school may decide to offer physics or not. Physics in Zambia has been taught since independence in 1964. In early 1980s Physics was taught to only form IV and form V as the curriculum demanded. By mid 1980s the curriculum changed from 2 years high school

to 3 years. This allowed more time for learners to prepare for O-level physics examinations. In turn the number sitting for the examinations gradually increased. The number of learners sitting for O-level physics examinations has not continued to increase as noted from ECZ reports (ECZ 2001) "There has been a gradual decrease in the number of centers offering physics." The decrease in centers offering O-level Physics implies a reduction in the number of learners taking physics as a subject. 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. Meanwhile, those that are still offering physics, grades obtained by learners at the end of high school are not encouraging because they are mostly very weak. The grades boarder mostly in credits, satisfactory and unsatisfactory, very few score merits and distinctions. This alludes to the another problem of nature of passing. Kostyuk (ibid) pointed out that the majority of the candidates who passed Physics examinations were in credits and satisfactory range and fewer in the distinction and merits grades.

Worldwide, fewer girls generally study physics than boys (Barmby and Defty, 2006, Greenberg 2006), because physics has being stigmatized as a subject that causes under achievement in one's academic life. Physics is the least popular science subject in the world to the girls compared to boys (Kostyuk, 2004).

Every year as results are being announced by the Minister of Education in Zambia, a differential margin in performance between boys and girls in noted. Analysing results at school level in different provinces indicate that girls performance in physics are lower than boys due to their negative attitudes towards physics. The government (govt) has indicated concerns in the educational policy document over the poor performance of learners in sciences. It has also incorporated other stakeholders with the same concerns so that the country attains it version of having a lot of females take up jobs referred to as men's job in the technology industry. Other stakeholders are Teacher Education Department (TED), Strengthening of Mathematics, Science and Technology (SMASTE), Flemish office for international cooperation and technical assistance (VVOB) and FAWEZA strengthening mathematics, science and technology (FAWEZA SMT). So far no studies have been conducted to determine why most girls tend to perform poorly in physics at O-level examinations and yet accorded same opportunities and facilities as boys.

1.2 STATEMENT OF A PROBLEM

Female learners at O-level certificate in Zambia are all subjected to the same learning and testing conditions in physics as the boys. After final assessment at school certificate it was observed that the percentage of boys scoring better grades in the subject is higher than the girls, despite being accorded equal opportunities in learning and assessment. Various strategies like School Based Continuous Proffesional Development (SBCPD), In Service Education Training (INSET) and Action to Improve English, Mathematics and Science education have been in place but very little improvement has been seen in the learner performance in Physics. According to ECZ (2004) reports show that the majority candidates that sat for the Physics examination that year obtained pass grades of five or higher. This scenario is even worse for the female learners who are at much lower percentage in the passing grades. This research sought to investigate the factors leading to low passing percentage in the female learners at O-level Physics examination.. The problem merits investigation as 30% of all workmanship has been awarded to the girl child by the government and that they are supposed to perform competitively against the boy child.

1.3 AIM OF STUDY

This study was aimed at exploring factors that lead to underachievement in O-level physics examinations for female learners. It also attempted to identify whether the kinds of perceptions and attitudes female learners have towards physics had an impact on their performance. It further attempted to establish possible measures which could be instituted to alleviate the high failure rate in female learners during the O-level Physics examinations.

1.4 OBJECTIVES OF THE STUDY

1. To establish kinds of perceptions female learners have of Physics?
2. To establish kinds of attitudes female learners have towards Physics?
3. To look for the factors which affect the academic performance in females at O-level Physics examination and establish the impact they do have on O-level Physics examinations.
4. To compare female performance in Physics at O-level in co-education and single sex school (grant aided).

1.5 RESEARCH QUESTIONS

1. What are Zambian learners' perceptions of Physics?
2. What are Zambian learner's attitudes towards physics?
3. Is there a difference in performance in physics between girls and boys in high at O-level examinations?
4. What factors affect performance of females in Physics during O-level examinations?

1.6 SIGNIFICANCE OF THE STUDY

At the time when government is promoting 30% of women in high decision making positions, it is important that we establish why this allocation has not been satisfied hence the reasons why this study was significance. Firstly, findings of this study will help in improving the teaching of physics and would provide a ground for further research. It would also help science educators inculcate positive perceptions and attitudes towards the learning of physics. Thirdly, Findings will help Ministry of Education (MOE) and Curriculum Development Centre (CDC), in policy making and designing a curriculum that would promotes positive attitude and perception in the learning of physics. Curriculum designers should create a conducive environment that would provide better results for girls in physics at O-level. Fourthly, findings of the study are likely to influence teachers of physics to impact positive perceptions and attitudes of physics in the learner. Lastly the questionnaire used in the study may also serve as a measure for pupils' perceptions and attitudes towards physics including other subjects or disciplines.

1.7 DELINEATION OF THE RESEARCH

The research did not include respondents outside central province high schools. Central Province is made up of six district i.e Kabwe, Mkushi, Serenje, Chibombo, Kapirimposhi and Mumbwa.

1.8 LIMITATION OF THE STUDY

There were a number of factors that restricted the researcher from obtaining a wider scope of information. These included: Geographical position of schools outside Kabwe district made it difficult for the researcher to reach various in time. Out of 31 high / secondary schools only a third of the schools offered pure physics at their schools. Among those schools that offered pure physics Caritas Convent School Stephen Luwisha (another convent school) had full classes of 35 female learners. The rest of the schools had less than 20 learners (both male and female learners) in a class and some as low as one learner as was the case with Bwacha High School.

1.9 OPERATIONAL DEFINITION OF TERMS

1. **ACADEMIC ADJUSTMENT:** This refers to the pupil's ability to adequately cope with demands of the high school amount of subject and class tasks.
2. **ATTITUDES**: This refers to particular behaviors' towards physics or science and the learning of it. It can be positive or negative depending on the situation.
3. **BLOOM'S TAXONOMY**: A set of classification principles on cognitive, affective and psychomotor categories of learning.
4. **FAILURE RATE**: The ratio of the number of pupil who have failed the examination against the total number of pupils who sat for the examination.
5. **FEMALE LEARNERS**: Girls learners as well as breastfeeding girl learners.
6. **FORM IV AND FORM V**: Refers to grade 11 and 12 currently
7. **IMPACT**: This refers to the intended or unintended negative and/ or positive effects of transition on the academic performance of pupils.
8. **LEARNERS**: This refers to high school pupils in grade 12.
9. **PASS RATE**: The ratio of pupils who passed the examination against the total number of pupils who sat for the examination.

10. **PERCEPTION OF PHYSICS AND SCIENCE** : This refers to an individual' particular way of understanding or thinking about physics or science. Where science has been used it implies Physics.

11. **PERFORMANCE**: This refers to the marks and grades obtained by the female pupils at grade 12 school certificate examination.

12. **PERSONAL ADJUSTMENT**: This refers to the pupils' capacity to experience intrapersonal growth in form of sense of purpose, good sense of judgement, self esteem, emotional intelligence and stress management.

13. **PHYSICS**: Refers to pure or o-level physics taught as a separate subject.

14. **POLICY**: The statement of intention directed at solving problems in order to achieve or attain desired goals.

15. **RESPONDENT**: This refer to a randomly selected pupils taking part in the research.

16. **SCIENCE**: Refers to physics and chemistry, taught separately but jointly graded as one subject.

17. **VALUE OF PHYSICS**: The importance or usefulness of physics in an individual's life.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

2.1 INTRODUCTION

This chapter is reviewing related literature on factors that are leading to underachievement in female learners at O-level physics. There was very little or no information that could be used as part of literature review on Headteachers, Head of Science Departments, and teachers of physics' responses to the poor performance in O-Level Physics examinations. This led to only covering the following in the literature review; importance of physics, value of physics to a female learner, personal, social, and academic adjustments, perceptions, attitudes, language, teacher graphing significant figure, policy, and learning environment.

2.2 IMPORTANCE OF PHYSICS

According to Till (1971:309) 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" In this vein physics is very crucial in understanding the world around us, the world in us and world beyond us. It challenges our imaginations with concepts that lead to great discoveries that changes one's life. For example in the lives of Bill Gates inventing the computers and Ben Carson with the surgery on Siamese twins.

Kostyuk (2004); Physics is the theoretical foundation of engineering. The importance of physics isn't limited to the hard science. "Increasingly, physicists are turning their talents to molecular biology, biochemistry, biology itself and medicine.

According to Reif (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 for the relative value of results. It must provide, for all pupils knowledge of the material world and of the forces of nature 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". This implies that physics education equips a person with ideas to invent equipments like cellphones, internet, lasers and computers. It also equips a person for work in many different and interesting government laboratories (labs), on college campuses, and in the astronaut corps.

According to IUPAP (1999), Physics plays a key role in the future progress of humankind. It says that: " Physics is an exciting intellectual adventure that inspires young people and expands the frontiers of our knowledge about Nature. Physics generates fundamental knowledge needed for the future technological advances that will continue to drive the economic engines of the world. Physics contributes to the technological infrastructure and provides trained personnel needed to take advantage of scientific advances and discoveries. Physics is an important element in the education of chemists, engineers and computer scientists as well as practitioners of the other physical and biomedical sciences. Physics extends and enhances our understanding of other disciplines, such as the earth, agricultural, chemical, biological, and environmental sciences, plus astrophysics and cosmology subjects of substantial importance to all people of the world. Physics improves our quality of life by providing the basic understanding necessary for the developing new instrumentation and techniques for medical applications, such as computer tomography, magnetic resonance imaging, positron emission tomography, ultrasonic imaging, and laser surgery.

2.3 VALUE OF PHYSICS TO FEMALE LEARNERS

According to Till (1971), the knowledge of physics is a unique facet and its understanding fosters man's appreciation of nature and its characteristics. International Union for Pure and Applied Physics (IUPAP) describes value of physics to the student as inspiring and expands the frontless of knowledge about nature. It also generates fundamental knowledge essential in future technological advances that continue to drive economic engines of the world. Physics provides personnel needed to carry out scientific researches and discoveries hence contribute to technological infrastructure. Physics is important in the education of chemists, engineers and computer scientists. It extends understanding of other disciplines, such as the earth, agricultural, environmental sciences, astrophysics and cosmology that have been found valuable by all the people of the world. This is supported by (Kostyuk 1998:1) who states that "knowledge in this

subject is vitally important for engineers, technicians, scientists, designers, pilots, doctors meteorogists and many others".

The importance and usefulness of science in the future lives of females cannot over emphasized. According to (Guindiza 1983) the importance of science in the economy development of a country depends on proper govt-scientist cooperation for a significant economic development to be achieved. Many are times when females fail to determine the usefulness of learning physics in their future life. The way females are brought up by parents are meant to believe they can still make it in life without physics as their parents never did physics at school and for those that did, failed it and yet have excelled in life. Meanwhile the values the learner upholds in physics are of great importance for a learner to achieve highly in the dynamic World.

According to Russell and Petries (1992), factors which affect learner's academic performance are basically three, and these are personality, social and academic adjustments.

2.4.1 PERSONAL ADJUSTMENT

As the girls are meeting the challenge of being in high school, they are faced with excitement, curiosity and enthusiasm to excel in life and in science. This feeling needs to be natured well by those that surround them implying the parents and the teachers. If not well handled by parents and teachers, the feeling develops into stress. De meuse (1985) found out that stress was negatively correlated with academic performance. Stress can be generated from teacher's attitude towards the girl child in the learning of science. Whyte (1986:246) says that teacher attitudes are 'Girls just can't do maths and the abstracts in physics are way beyond them." Oberg (1960) identifies the results from such statements as generating in females a feeling of inadequacy, frustration and anxiety. A strong link notes between stress and emotional depression and low performance in academic work (Bell 1995; Dubois and Felner, 1992). Once emotions depresses, a female will fail to resolve personal challenges and this leads to underachievement at O-level physics examinations.

Most females lack self concept because of having a belief in cultural determinism. Judith Whyte (1986:248) says "teachers seemed to accept girls less interest in physical science and technology as a fact of life". According to Adetunde (2008) "A rural man thinks that the female's main office is the kitchen has contributed greatly to the low education levels of females in the

countries". Cultural beliefs indoctrinate the females that the fail to possess self-concept and strive to achieve very high scores at O-level physics examinations comparing boys work load at home with girls it is observed that the girls tend to play 'mother' hence have a lot of house chores to do. This creates very little times for them to reflect on what they have learnt in school at the end of each day.

2.4.2 SOCIAL ADJUSTMENT

There happens to be a lot of social problems that influence negatively on the performance of females in school. According to junior civics grade 8 pupil's book, society views a female as having a place in the kitchen and that they should perform all house chores. The school on the other hand believes that the girls are not good in mathematics and science but only in Home Economics, English and Religious Education, History and Zambian Languages(Solesole, 2008). With such a perception women feel they are inferior and weak while men are strong and dynamic.

2.4.2.1 Poverty: (Adetunde, 2008): Coming from a home that is financially challenged, a female tends not to concentrate on her studies but on how to overcome the challenge of poverty immediately. Physics learning becomes of less value as she looks for other avenue like prostitution, doing contractual jobs, teenage pregnancy or marry early in order to overcome the immediate challenge.

2.4.2.2 Lack of parental care (Adetunde, 2008): With the growing HIV/AIDS pandemic, most girls become guardians to their siblings at an early age. This causes females to lose interest in school as they assume the roles of a mother. Lack of parental care brings about lack of mentors to motivate the girl child to excel highly in school subjects and indeed in Physics.

In cases where parents are living very far away from the schools the girls are attending, the girls resort to renting houses near school in order to assess the school. They become venerable to so many vices hence lose concentration during lessons.

2.4.2.3 Ignorance of parents (Adetunde,2008): Level of education and achievements for parents during their school days impacts positively or negatively to the girl child. As some parents would have failed science at school, they do not encourage the girls to put in a lot of

effort in learning science. Many times such parents tell their children of their underachievement in physics at school and bemoan that their offspring's would equally not perform to expected level. At the same time, parents to these females do not understand the importance of learning physics in relation to every day life so they do not urge girls to work hard in physics in order to find better jobs.

2.4.3 ACADEMIC ADJUSTMENT

According to Bandura (1977), Academic self efficacy refers to the belief a learner has on her ability to successfully perform given learning tasks or behaviour. In academic adjustment, school environment plays a vital role in the academic performance of females. A female always want to be identified with nice things and nice surroundings. Being at school which has good infrastructure enhances motivation in the learner. The school environment includes well stocked science laboratories, adequate and well qualified teachers who take a kin interest in the performance of females in their science classes. Other than teachers, availability of text books to be used in class and after classes (Adetunde, 2008) can improve female's performance.

2.5 PERCEPTIONS AND ATTITUDES

In addition to personality, social and academic factors, perception of both the learner and the teacher in the learning of physics is an importance factor. The attitude of the learners and the teachers towards science may inhibits high achievement in physics.

2.5.1 Perceptions of Teachers

According to Encarta Encycopedia @ Microsoft (2000), "Perception is a process by which organisms interpret and organize sensation to produce a meaningful experience of the world". Perception of physics by teachers has not changed much from generation to generation in that they believe it is abstract and too difficult for girls to manage and this is due to factors like cultural changes and social settings. However, a few teachers believe that girls can perform as good as boys in physics. Teachers have a responsibility of formatting perceptions and attitudes as noted by Dekker and Lemmer (1998:15) who states that, "Teachers constitute the most important educational influence on pupils' learning of Mathematics. Teachers communicate acceptable standard of achievement in various subjects through a myriad of explicit and hidden messages".

2.5.2 Perception of female learners

According to Rawnsley and Fisher (1998) depicted that students perceptions of social environment of learning accounted for a median of 30% of the variance in cognitive affective and behavioural post course measures. Female learners feel the society, the education system and the technology world has provided them with a subject that would better their lives at the same time hasn't provided a way to cope with the subject. The learners have a positive perception of studying physics and pursuing it at higher levels. It is important that the learners have positive perceptions and attitudes towards physics as postulated in studies by Rawnsley and Fisher (1998).

2.5.3 Attitude of learners.

Ooperheim (1979) defines attitude as 'a state of readiness and a tendency to act or react in certain manner when confronted with a certain stimuli." Furthermore, Baron and Byre (2004) states that" attitudes seem to operate as schemes mental frameworks that help us to interpret and process many kind of information. Harlen (1997:39), says that "the attitudes affect not only what is learned but the effort put into tasks given which in turn affect the likelihood of success". From the definition one is made to understand that one's attitude is observed through speeches and behaviour when confronted with problems in science. It is also when one exhibits readiness to tackle problems in physics with a positive mind. The readiness to respond to stimuli embedded is in one's willingness to learn new concepts in science. Harlen (1977), states that "pupils' attitude affect the willingness of an individual to take part in certain activities and the way in which they respond to person, objects, or situation." This means that the learner will be ready and willing to learn physics if their perception of it is positive. When attitudes are positive they will not only affect what is being taught but also the effort being employed in tackling tasks given which would enhance success in life. Perceptions bread attitudes in a learner which could be positive or negative in relation to the needs of society and the values being up held by society.

2.5.4 Attitudes of teachers

Attitudes and approaches of teachers in the learning of physics play a vital role in the learner. Whyte (1986:246), says that "teachers seemed to accept girls being lesser interested in physical science and technology as a fact of life". There seems to be traditional belief in teachers that

mathematics and science subjects are male preserve. Since it is observed that teachers have low expectations of females' ability to excel in science, they would not inculcate positive attitudes towards learning of physics in females. Whyte (1986:247), "Girls just can't do maths and abstracts in physics are way beyond them". On examination of the statement there is very little hard evidence for such a theory; it only says that the teachers have a belief that such discipline call for struggle and determination for a female to cope with. With such an attitude the teachers would be found in a way discouraging females in pursuing science related subjects such as physics and paying little attention to their search for information. Mwamwenda (1996) indicates that a teacher's belief is more important than his teaching techniques.

2.6 LANGUAGE

Another factor that contributes to formulation of perception towards physics is language during learning process. The unique scientific language has a great influence on the learners' perceptions of physics. This is made worse with failure to interpret symbols when solving given problems. For instance, the difference between "T'and't' in an equation is usually viewed the same.

Goldstein (1980:121) says that, "All thought is dependent on language influences the manner in which the environment is perceived and understood," This means that the teacher needs to use a language which is able to communicate the intended scientific information correctly. It would in turn initiate a positive way to perceive physics learning by the learners. On the other hand, if the teacher uses scientific terms that are not explained and / or understood by the learners can be deterrent to appreciating of the subject.

Some text books use language that has belief in cultural determinism. This is where females are believed to be less interested in sciences. The language portrays that studying physics for females is more difficult than other subjects. This is noted in the study done by Belcher (2003) who observed that the lack of common language between Mathematicians and Physicists was a root cause of learning difficulties experienced by Physics learners.

2.7 TEACHING ENVIRONMENT

Maqutu (2003:97) revealed that Science Education in developing countries served a number of challenges as they faced shortages of resources, textbooks, laboratories, equipped libraries, lack of qualified and committed teachers. Ogunniyi (1996:278) showed that the standard in science classroom would fall because of shortage of properly trained science teachers. In addition Shanyinde revealed that there were insufficient equipment and materials, insufficient classroom space, few teaching models and white boards. The study further revealed that the common method of teaching was lecture while demonstrations, practicals and projects were not in common use. This implies that the learning environment for most school does favour the teaching of Physics. The subject being taught by lecture method deprived learners of the perfecting the skill generated from conducting practicals. In addition Rogan (1988) showed that school environment had a big role in motivating the learners. The study revealed that poor physical structures such as dilapidated buildings, lack of science equipment, laboratories and libraries were demotivating to the learner.

2.8 TEACHER

Apart from the pedagogical skills the teacher learnt in college, the teacher fails to inculcate in the female learner critical thinking to make work in physics easier.

Fisher (1993) says "Critical thinking is the mode of thinking about any subject, content or problem-in which the thinker improves the quality of his or her thinking by skillfully taking charge of the structures inherent in thinking imposing intellectual standards upon themselves," The teacher also fails to make the lessons more exciting in that he or she does not provoke creative thinking, logical thinking and meta-cognition. Logical thinking is a process using reasoning consistently to make conclusions. Where as a creative thinker is one who practices higher order thinking skills (Bloom's Taxonomy) and uses his senses effectively to gather and assess relevant information. In meta-cognition the teacher needs to develop in the learner intelligent behaviour as a significant educational outcome.

Kostyuk (2004) revealed that in 2001 a big shortage of teachers of physics was noted. The study also revealed that within the available teachers a large number were under qualified or unqualified to teach physics. Under qualified teachers referred to those who had training of three

or less years and unqualified were those that had no formal teacher training qualification the two groups exhibited lack of subject content and appropriate classroom teaching skills. According to Paras (2001) the quality of the product of teaching physics is seen from the quality of learners produced. The study showed that poorly qualified teachers produced poorly qualified learners that later would become poorly qualified teachers. As a result UNZA has "tended to produce very few teachers, particularly in Physics Education, where for many years not more than three teachers graduated each academic year" (Haambokoma et al, 2002:19). The study by Muwanga-Zake (2000) outlined that poorly qualified teachers, deficiencies in practical skills and poor conceptual understanding passed on from teachers to learners were a source of poor performance in physics. Correct qualification of physics teacher is a graduate from a university with Physics as a teaching subject. The study by Kostyuk (2004) revealed that most of the schools in Zambia had very few or no graduate teachers of physics. The number of teachers in schools was dependent on the number graduating from UNZA. The study further revealed that for a number of years UNZA, School of Education had produced less than seven graduate teachers of physics sometimes none each academic year. The table below agrees with the findings in Kostyuk (2004) in a period of 16years between 1990 and 2005.

Table 1: Number of graduates from UNZA with Physics as their teaching subject from 1990 to 2005

Year of Graduation	Number of Graduates
1990	1
1991	1
1992	3
1993	2
1994	2
1995	1
1996	1

1997	0
1998	1
1999	3
2000	1
2001	0
2002	3
2003	10
2004	6
2005	4
TOTAL	39

2.9 GRAPHING AND SIGNIFICANT FIGURES

Poor graphical skills being imparted into the learners i.e. no emphasis on interpolation, extrapolation and graphical interpretation of slopes, rates and graphical error are inadequate. Lack of skills of plotting and interpreting of data presented creates problems in solving physics or mathematics related problems. Having poor mathematics background makes most of the learners fail to solve problems using significant figures. Mathematical requisites such as a basic knowledge of conversion of units, significant figures, scaling and reading on measuring instruments and apparatus, are lacking significantly.

2.10 POLICY

The Ministry of Education has no distinct policy on Physics Education but groups the three subjects - Biology, Chemistry and Physics into Science Education. The National policy document on education, Educating our Future, (MOE,1996) views Science Education as Physics Education inclusive Biology and Chemistry. With regard to Science Education, (MOE,1977:29)

stated that “today we live a scientific and technological era; 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”. The policies of the Ministry of Education at the time of the study were not stressing the needy areas of a specific science.

In conclusion the study did not review any literature on measures school management had put in place to alleviate the problems of high failure rates in O-level Physics examination. The literature reviewed highlighted possible causes to the problems in physics examination. The solution and measures suggested might be useful in alleviating the identified problems. It is inevitable that schools in Central Province put the planned actions into practice to over come the existing problems in O-level Physics examinations.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter looked at description of techniques which were employed during the collection, analyzing and interpretation of data presented. These included research design, study population, study sample sampling, research instruments, and ethical concern**s.** It further explains the procedure used for research data collection and analysis during the study.

3.2. Research Design

This research design was descriptive using both qualitative and quantitative methods. According to Kombo and Tromp (2006;9), "Qualitative research seeks to describe and analyze the culture and behavior of human and their groups from the point of view of those being studied. Qualitative research relies on a research strategy that is flexible and interactive".

A survey was used in this research because the data obtained can be generalized within given parameters. Mouly (1963:231) explains survey as being oriented towards the determination of the status of a given phenomenon rather than towards the isolation of causative factors. The atmosphere of the learner was surveyed using the perceptions of the learners of physics education. The academic performance was surveyed using the perceptions of the learners of physics education. The academic performance was treated as the variable dependent on the factor faced by females in high schools.

3.3. Study Population

Ten school administrators, 10 HODs, 40 Teachers of physics and 400 learners of physics from the selected high and secondary schools in central province constituted the study population. The population also included learners from grant Aided schools, single sex as well as from co-education government schools.

3.4. Study Sample

The study sample consisted of 40 pupils, eight teachers from Stephen Luwisha convent school. The respondents' age ranged from 16 to 20 years preferably. The school sample was selected for the following reasons. Firstly, it would be easily accessible. Secondary, the cost would be fairly low and thirdly, less time would be spend in conducting fieldwork.

3.5. Sampling Procedure

Cohen, (2003:103), "In purposive sampling, researchers handpick the cases to be included in the sample on the basis of their judgement of their typicality". To determine the sample, several factors were considered. The location of the school, whether the school was in urban, peri-urban or rural area. Since the study was focusing on factors contributing to under achievement in female learners in O-level Physics, only the schools in central province that were offering pure physics at O-level were considered and these are Caritas, Kalonga, Highridge, Kabwe, Stephen Luwisha, Bwacha, Jasmine, St. Paul's, Mumbwa and Mpunde high schools. The sample comprised of 3 girls only schools, 2 boys only school and 5 co-education.

3.6. Research Instruments

A questionnaire comprising 15 objective questions and six structured questions for the teachers of physics was administered. As for the learners 31 questions where in the questionnaire and each question had five point rating scale of strongly agree, agree, uncertain, disagree, and strongly disagree. These were peculiar to only the questionnaire for learners of physics. The questionnaire for school managers and HODs had three structured and 18 objectives questions.

The measuring instrument was piloted in a grant aided school in central province to check its validity and reliability.

In addition to questionnaires, discussions, observations, field notes, workshops and interviews with the respondents were also conducted (refer to appendix I to vii).

Furthermore, yearly examination results in physics (Between 2006 and 2008) were also collected from the schools visited.

3.7 Validity and Reliability

When selecting instruments to be used in the research, validity and reliability were taken into account. Validity is the extent to which an instrument measures what is supposed to measure, (Fisher, et al,1991). The researcher collected data using questionnaires, interviews and observations that contributed to internal validity. Whereas external validity was achieved by questions generated from literature review.

Reliability is summed up by the word consistency. A pilot study was conducted to assess the reliability of the questionnaire. The pilot study was conducted at Stephen Luwisha Secondary School, which was not included in the main study. One of the main reason to have a pilot study was to test the reliability of the questionnaire. To test the reliability of the questionnaire, a split-half was conducted. According to Mulder (1996), a split-half test measures the internal consistency of the questionnaire.

3.8 Research Data collection Procedure

The questionnaires were distributed to each respondent in the same premises. The respondents were talked to on the general nature of the research and advised on how to fill the questionnaire independently and appropriately. Constant check was done as the filling of the questionnaire was going on. The respondents were given as much time as they needed to answer the questionnaires. A set of examinations results for in Physics three years (2006 to 2008) was collected from the school administration. The career and guidance teacher was asked to help in collecting the questionnaires from the respondents in each respective school.

3.9 Data Collection techniques

Interview schedules were used to gather data from physics of teachers, HODs and school managers. Discussions and observations were also used to gather some reflection notes from

the learners. In addition interviews were used to gather information on proposed measures to put in place in order to improve performance in physics.

3.10 Data Analysis Procedure

Quantitative data was analyzed using percentages derived from analysis of the data collected. Tables were used to generate graphs that represented statistical information. Interview data were analyzed qualitatively by coding the questions in the interview. The data being collected was then examined side by side with those subsequent interviews.

3.11 Data Interpretation

Interpretation of the data was conducted to draw up conclusions. Data interpretation was based on data which were collected and analyzed. Data were put into groups according to the respondents and objectives. Conclusions were drawn to determine the measures that would alleviate problems of poor performance in Physics.

3.12 Ethical Concerns

All participants were assured that the information they gave was treated with confidentiality. Names of participants were omitted and they were only identified by a number and not by name, this helped in avoiding biased responses from them. Interviews were conducted in closed rooms by the researcher herself.

CHAPTER FOUR

RESULTS OF THE STUDY

4.1 Introduction

This chapter presents findings of the research on factors that contribute to under achievement of female learners in O-Level physics examinations. The presentation of the findings was done in sections of the qualifications of teaching staff, gender and teaching subject and structured questions.

4.2 Qualifications

All the Head Teachers interviewed were degree holders. Nine of them were Social Sciences biased and one was Science. Out of the ten, two are females. Three HODs were degree holders, three had advanced diplomas and five had diplomas. Out of the ten, two were females and only one male was physics biased. The 16 teachers interviewed were diploma holders with only three physics biased. Out of the 16 only two were females.

4.3 Factors contributing to the underachievement in O-level Physics examinations

The study identified the following as factors that were causing under achievement in O-level Physics examinations.

Females lack experience in science due to differential teacher behavior towards males and females taking physics. Males in high schools taking O-Level physics are favoured both with respect to the amount of time and of quality of interaction as compared to females taking the same subject. When performing experiments males usually monopolize the experiment and the females are made to be secretaries in recording data.

Lack of female role models is a demotivating factor for the girls. As the situation is now from UNZA only 4 females i.e. 1 in Natural Science, 3 in the school of Education have successfully graduated with physics as their teaching subject. In addition, lack of teachers of Physics, female engineers, technicians to motivate the female learner tend to make them hate the subject hence perform badly at O-Level examinations.

Physics in most cultures is socially defined as masculinity, while this is not a way for females to be feminine. Cultural belief promotes laziness in working hard as there will be a "Mr Right" to marry the females. This implies that there is no need to put extra effort in physics as marriage is the other alternative. This has led to parents failing to encourage learners in pursuing physics related courses making the learner have no interest in the subject. In addition, learners lack parental guidance due to the learner renting an apartment because of parents staying far away from the school. The learner spends less time on studies as she is trying to create more time for managing a home. In other cases the learner became a guardian as they would be looking after their siblings due to being orphaned at a tender age.

Lack of properly trained teachers. Most of the teachers of physics are diploma holders whose training is tailored for junior secondary and tend to, not adequately cover the syllabus. Poor training also come from private colleges and universities that impact theoretical knowledge in the teachers with little or no practical skill, Azalia. Where teachers are available, they are not sufficient and experience heavy teaching loads. For example at Caritas Convent, there are only three (3) teachers of science of which one is physics. This raises the number of periods. The situation at this school is that average periods per teacher of science are 51 far beyond the school time table of 40 periods per week.

Most teachers who teach physics are diploma holders trained to teach Environmental Science. These lack the subject content of physics in certain topics. They may fail to deliver the necessary knowledge and skills much needed by the pupils, in their O-Level physics examination. In addition, in basic schools, seconded teachers teaching grades 8 and 9 are not competent enough to handle the physics content. As though not enough, basic schools have no enough apparatus and working laboratories. This implies that environmental science is being taught theoretically leading to poor foundation for a practical subject like physics.

Physics is not taught from the practical point of view but theoretically, making it difficult for learners to understand the concepts and theories of physics. The relationship between physics and real life situation or problems of society are not emphasized that females give up on physics once met with a slight obstacle or are demotivated about it.

Another demotivating factor is lack of teaching and learning materials such as text books,

e-learning, and apparatus.

Syllabus is too wide to be completed in three years. Poor availability of learning and teaching materials and lack of well furnished laboratories. Shortage of equipment for individual practicals, textbooks and e-learning.

Attitudes of teacher are that they encourage female students to concentrate on other subjects to physics in order to obtain better grades (Kelly, 1986). Poor attitudes affect the interest and values of the learners because they are not stimulated. Teachers' negative attitudes towards girls performance in physics starts from primary education. In addition, the wrong perception of the subject by both the teacher and the learner leads to females perceiving physics to be challenging and be psychologically defeated.

JETS has tried to inculcate interest in female students in physics. Results show that girls interested in JETS have performed very well at O-level in physics mostly obtaining grades 1 to 4.

Enrolment at tertiary in physics is low and graduating students are low due to drop outs. Those who manage to graduate become demotivated with the conditions of service, hence brain drain to neighboring countries and private sector.

Marginalizing one as being poor in maths as in physics. It involves mathematical skills and calculations.

Poor conditions of service have lead to a number of graduate teachers in physics to join other industries instead of joining the ministry of Education. In another view the govt pays more attention to sports than the teaching of science hence low apparatus and equipment for science lessons.

Caliber of teachers, teacher treatment, teaching practices, few female role model and society perception of girls are contributing greatly to under achievements.

Low teacher morale as a result of conditions of service. This has been worsened by the government's policy of enrolling all those with full certificate in grade 10 irrespective of their

performance in Mathematics, Science or English at grade 9. The policy has also lead to rally classes of 60 to 70 learners per class of which some of those learners cannot read and write.

4.4 Measures taken by Schools to motivate the teachers of Physics.

Some schools have accommodated these teachers in very good houses at a very economical house rent as a form of incentive. While other schools were giving an incentive in form of money monthly or termly to the teachers. As an in house training, administrators they have provided refreshments as the group of teachers are enlightening each other on topics of concern.

Study tours to industrial and power stations have been a high motivator as learners relate what they see and what they cover in class. At the same quiz competition were organized in physics among the grade 12s.

Awarding the most improving and deserving learner in physics it allows learners to work extra hard.

4.5 Steps taken by the school by the school to motivate the learner.

The learners were motivated by increasing school quizzes in science, study tours to power stations and science related environmental areas. Increasing the number of assessments, making the lessons more hands on and increase on the practical tests.

Encourage them to join JETS meetings in school and participate in school, district and regional fairs. Ensuring that JETS activities are running through the year in the school.

Invite different personnel to give motivational talks to the female learners

4.6 Concerns on failure rate in Physics examinations.

Schools felt that the failure rate was a concern as the schools were trying to promote science education for female learners. Lack of good results in physics would lead to the school leavers to fail to find places in colleges and universities. Failure in physics is leading to less achievement in technology in this dynamic world.

4.7 Comparison of enrolment by gender.

Table 2: Enrolment of grade 12 learners taking physics in Central Province between 2006 and 2008.

	2006	2007	2008
MALES	44	87	67
FEMALES	38	31	35

The table above shows the total enrolment for those that sat for O-Level Physics from 2006 to 2008. From the table, it is noted that there are fewer female learners taking O-Level physics than boys.

Table 3: Educational Qualification of Teachers of Physics

School	Degree Holders	Advanced Diploma	Diploma	Total (N)
A	0	1	2	3
B	0	0	2	2
C	0	0	2	2
D	0	0	2	2
E	1	0	1	2
F	0	0	1	1
G	0	0	1	1
H	0	1	0	1
I	0	0	1	1
J	0	0	1	1

The table shows that the majority of teachers of physics are diploma holders with 81% (N=13), where as Advanced Diploma has 13% (N=2) and Degree had 6% (N=1)

Table 4; Views Held by Teachers of Physics

Views	Respondents
Girls can not achieve highly because physics is abstract	N=6 40%
Physics is difficult for them	N=3 20%
They are low achievers because they are lazy	N=6 40%

The teachers feel that the girls are not performers. They are always lazy and do not strive to achieve better results.

Table 5; views held by learners of physics

		Strongly disagree (%)	Disagree (%)	Neutral (%)	Agree (%)	Strongly agree (%)
	I do not answer question in class because I can not speak good English language.	320 (80)	80 (20)	0	0	0
	I do not finish my work in class because I do not clearly understand the questions	20 (5)	100 (25)	180 (45)	80 (20)	20 (5)
	I find it difficult to learn physics because the teacher uses scientific terms which	200 (50)	160 (40)	0	20 (5)	20 (5)
	I don't feel comfortable in the physics laboratory because this is more males doing activities than for females	340 (85)	40 (10)	0	20 (5)	0
	I do not usually have a chance to learn physics in the laboratory at this school	220 (55)	80 (20)	0	0	100 (25)
	Physics in interesting to learn	0	0	80 (20)	260 (65)	60 (15)
	My teacher of physics feels that I would not pass my physics exam.	260 (65)	100 (25)	0	20 (5)	20 (5)
	Physics has many challenge topics to learn	0	40 (10)	140 (35)	160 (40)	60 (15)
	Physics is difficult to learn because of too many formulae to remember.	100 (25)	180 (45)	80 (20)	20 (5)	20 (5)
	Physics has a lot of information which seems to be abstract	100(25)	200 (50)	80 (20)	20 (5)	0
	The mathematics in physics makes it more demanding than other science subjects.	80(20)	100(25)	60 (15)	140 (35)	20 (5)

Even though physics is perceived to be difficult, the female learners do have a positive perception of physics. All they need is encouragement so that their self esteem is raised.

Table 6; Perception of physics by gender (N=166 for girls and N=234 for boys)

Statement	Percentage Responses (Girls)	Percentage responses (Boys)
Physics is interesting	24.2	32.1
Physics is the most enjoyable subject they learn	34.8	38.5
Physics is the most challenging subjects offered at school	30.3	28.9
Physics is the most interesting school subject	37.1	35.8
Physics is the subject I like the most	40.2	19.8
Physics is for boys only	8.3	5.9
Physics is for the gifted only	36.4	38.5
Physics is difficult to understand	25.8	24.1
Physics is useful in our life	84.1	88.2

Table 7; Learners preference on subjects starting with the most desired.

Subject	Percentage	Rank
Biology	60	1
Chemistry	25.8	2
Physics	14.2	3

Findings were that Biology was ranked the easiest (60.0%) science subject to learn, followed by chemistry(25.8%)and lastly physics(14.2%).The research revealed that physics among the three sciences was the least popular.

DATA COLLECTION SHEET 1

O-LEVEL PHYSICS EXAMINATIONS RESULTS FOR CANDIDATES IN SELECTED SCHOOLS IN CENTRAL PROVINCE YEARS 2006 BY GENDER.

SERIAL NUMBER	SEX	NO SAT	GRADES									NO PASSED	NO FAILED	QUALITY PERCENTAGE
			1	2	3	4	5	6	7	8	9			
A	males	44	1	2	8	2	6	4	12	6	3	41	3	56
B	females	38	3	0	4	0	3	2	12	10	4	34	4	35

The data sheet of 2006 shows that most candidates obtained grades 7,8and 9 in physics representing 56% quality pass for males and 35% for the females. This demonstrates a higher failure rate for the female learners in physics at O-Level because the failure percentage for the females was 65% where as for the males was 44%.

DATA COLLECTION SHEET 2

O-LEVEL PHYSICS EXAMINATIONS RESULTSFOR CANDIDATES IN SELECTED SCHOOLS IN CENTRAL PROVINCE YEARS 2007 BY GENDER.

SERIAL NUMBER	SEX	NO SAT	GRADES									NO PASSED	NO FAILED	QUALITY PERCENTAGE
			1	2	3	4	5	6	7	8	9			
A	males	96	7	3	12	6	2	7	36	16	7	89	7	42
B	females	31	0	1	3	3	1	2	13	7	1	30	1	33

The data sheet of 2007 shows that most candidates obtained grades 7,8and 9 in physics representing 42% quality pass for males and 33% for the females. This demonstrates a higher failure rate for the female learners in physics at O-Level because the failure percentage for the females was 67% where as for the males was 58%.

DATA COLLECTION SHEET 3

O-LEVEL PHYSICS EXAMINATIONS GRADES FOR CANDIDATES IN SELECTED SCHOOLS IN CENTRAL PROVINCE YEARS 2008 BY GENDER.

SERIAL NUMBER	SEX	NO SAT	GRADES									NO PASSED	NO FAILED	QUALITY PERCENTAGE
			1	2	3	4	5	6	7	8	9			
A	males	67	12	8	1	4	2	7	15	11	7	60	7	57
B	females	35	2	1	2	2	0	2	13	10	3	32	3	28

The data sheet of 2008 shows that most candidates obtained grades 7,8and 9 in physics representing 57% quality pass for males and 28% for the females. This demonstrates a higher failure rate for the female learners in physics at O-Level because the failure percentage for the females was 43% where as for the males was 72%.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.0 Summary

5.1.1 Introduction

Chapter four presented the research findings. This chapter discusses the findings of the study and will then offer suggestions of have the research problem could be alleviated. All the research questions have been addressed in this chapter. Although the size of the sample was small compared to the number of school in the country, the analysis of this study confirmed several findings recorded by various researchers.

5.1.2 Summary of findings

More than 80 percent of the learners in the schools visited in Central Province of Zambia have positive perceptions and attitudes towards Physics. Some learners showed negative perception and attitudes towards Physics because they felt it was difficult to learn.

One interesting finding of the research was that female learners were more positive in their perceptions and attitudes towards Physics. A reverse of what was obtaining in previous times when female learner were more negative in their perceptions and attitudes towards Physics.

The research findings further indicated that physics is the least liked. Even though Physics is regarded as a difficult subject, the learners perceive it as interesting and necessary subject to be studied by all young Zambians.

Sixty percent of the learners strongly agreed that Physics was useful in their lives. Findings through FGDs (Focus Group Discussions) indicated that most learners go into high school with negative perceptions and attitudes that Physics is difficult to learn and demands too much of their efforts.

Findings indicated that learners despites being in different schools and taught by different teachers, have similar perceptions and attitudes towards Physics.

The findings indicated that the teachers were still using the traditional way of teaching bordering mostly on lecture method. The methods of teaching employed did not involve much of discussions, inquiry, discovery, video, game-teaching, e-learning and problem-solving, methods that promote understanding of Physics in the learners. This could be due to poor understanding of Physics by the teachers themselves or lack of motivation from stakeholders and poor remuneration by the govt.

In addition, the findings indicated that poverty, misapplied use of computers, poor reading culture among learners and long hours of watching TV by learners had a negative impact on the performance in Physics at examination time.

Furthermore, the research indicated that there was a difference in performance in Physics O-level examinations between the male and female learners. Enrolment at grade 10 in a pure physics class in most schools did not relate with the product at examination time.

5.1.3 Discussion of findings

Question one: What are Zambian learners' perceptions of Physics?

Most of the learners in the province have a positive perception about Physics. An interesting finding was that about 60 percent of the learners were ambivalent and said that they liked it. It can be noted that the learners generally accept that Physics is relevant to everyday life. However, they perceive the importance of Physics to being educational rather than its applicability to everyday life. In another view, the learners perceived Physics as the most difficult subject. This aspect came out clearly in the learner FDGs in which the learners indicated that most teachers of Physics were under qualified. 80 percent of female learners indicated that the teachers of Physics did not encourage them to work hard but always reminded them how bad they were in class and couldn't make it in the science world. This observation is supported by Whyte (1986:246) states that "teachers says that Girls just can't do maths and abstracts in physics are way beyond them". Wrong perception of the subject has led to the learners believing that Physics is a very difficult subject to learn in comparison to the other sciences.

Question two: What are Zambian learner's attitudes towards physics?

About 90 percent of the learners have positive attitudes towards physics. On whether they were all interested to learn physics, 80 percent strongly agreed that they were interested to learn all they could in Physics. Despite being interested in learning physics 40 percent indicated that the mathematics in physics made the subject difficult to cope with. 70 percent agreed to non practical lessons in Physics. Teachers agreed to the fact of non practical lessons during FDGs and indicated that they were mostly using lecture method to teach. The lecture method promotes rote learning and memorizing contrary to constructivist approach which demands active participation of the learners. The teachers have clung to the parrot kind of teaching Physics. In view of this it is imperative for the teacher educators to offer refresher courses to teachers of Physics in teaching strategies that will encourage the problem solving approach.

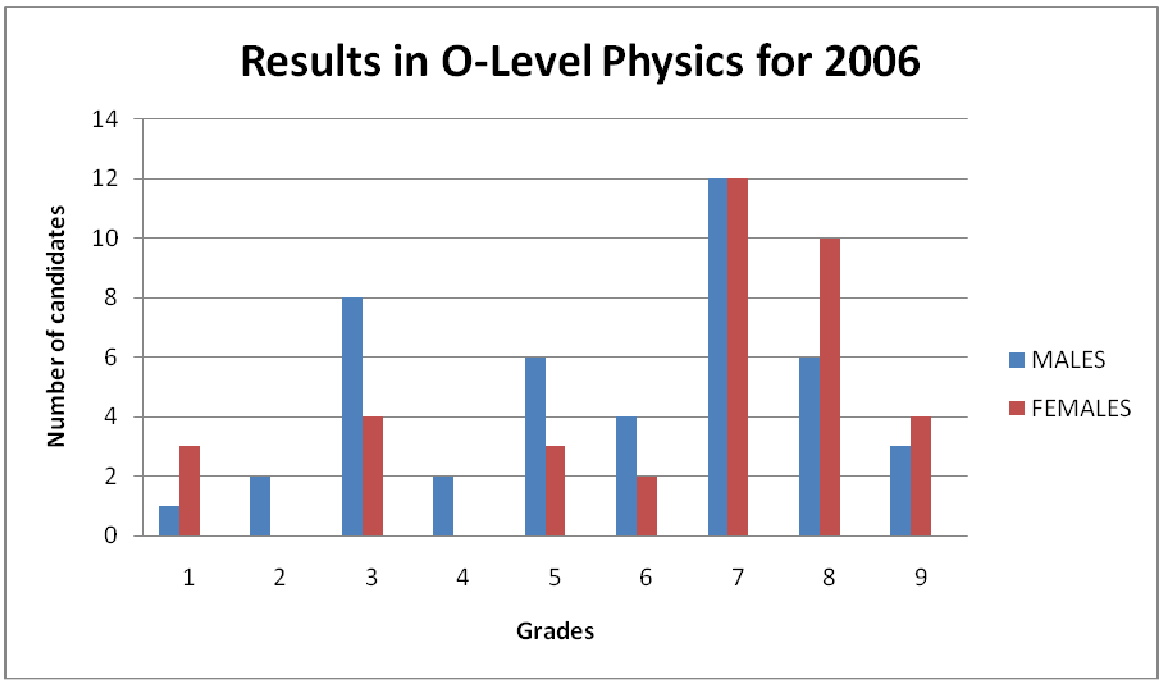
Teachers' negative attitudes towards female learners performance in physics starts from primary education when the learners are exposed to science and teachers feel that they cannot perform as well as their male counterparts.

Learners' perception and attitudes towards physics seems to have an implication on the learning of Physics as they determine the preparedness of the learner to the learning situation. At the same time teachers' perception and attitudes to teaching have their own effect on the learning of Physics. According to Ernest (1998), the attitudes of both the learners and the teachers towards the learning of subject were of great importance to the learning and teaching of the subject. The teacher's perceptive and attitude plays a big role in motivating the learner into having a positive perception and attitude towards the subject. This is confirmed by Ernest (1998), says that if a teacher is excited, so are the kids.

Question three: Is there a difference in performance in physics between girls and boys in high schools at O-level examinations?

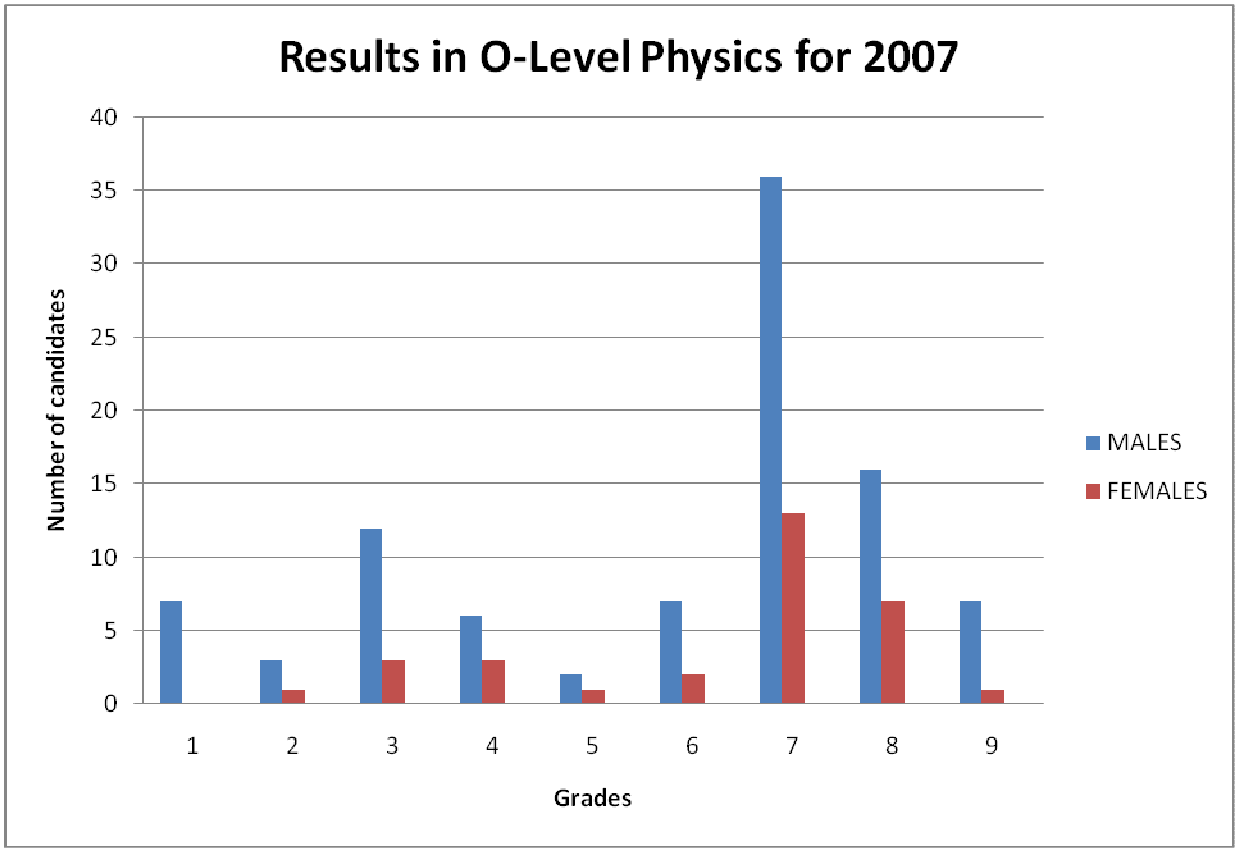
The study showed that there was a difference in performance between the male and female learners in O-level Physics. The female learners were scoring grades mainly in credits and above. This has been shown in the graphs below.

Chart 1 Bar chart on the performance of learners by gender in physics for the year 2006



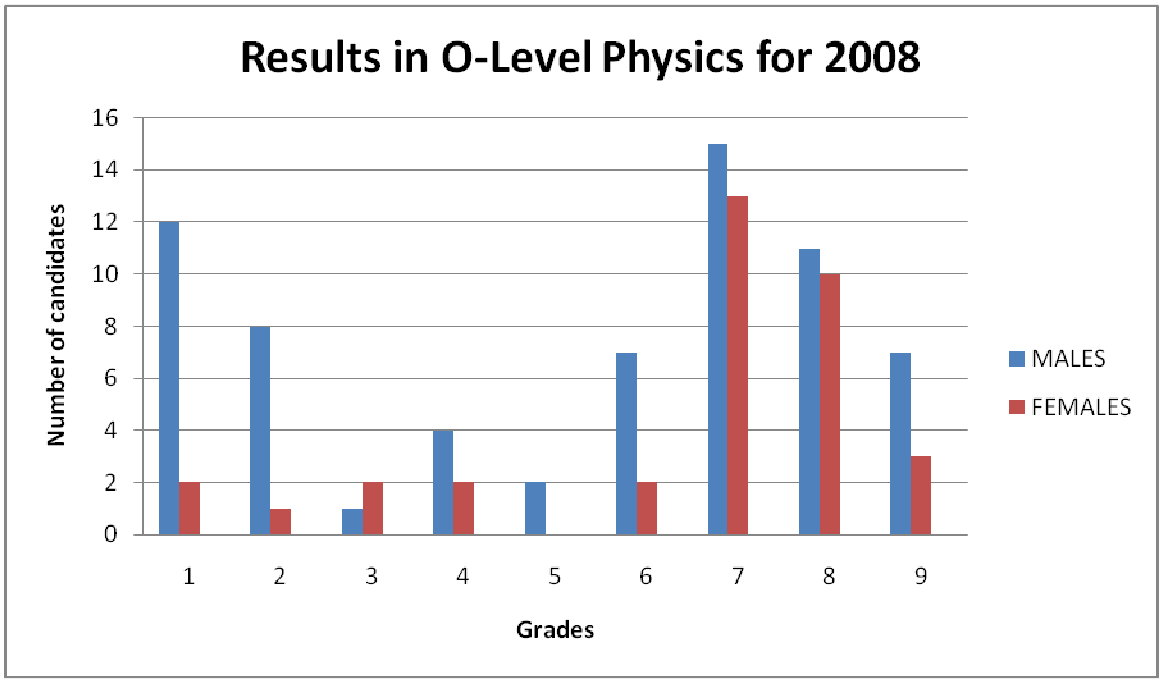
In 2006, out of 38 females candidates who sat for the examination only 89% (N=34) passed. Out of 34 candidates 65% (N=22) obtained grades 7 and 8 leaving only 35% (N=12) with quality grades. At the same time ,out of 44 males who sat for the examination, 93% (N=41) passed. Out of 41 candidates 44% (N=18) obtained 7 and 8 leaving 56% (N=23) with quality grades.

Chart 2 Bar chart on the performance of learners by gender in physics for the year 2007



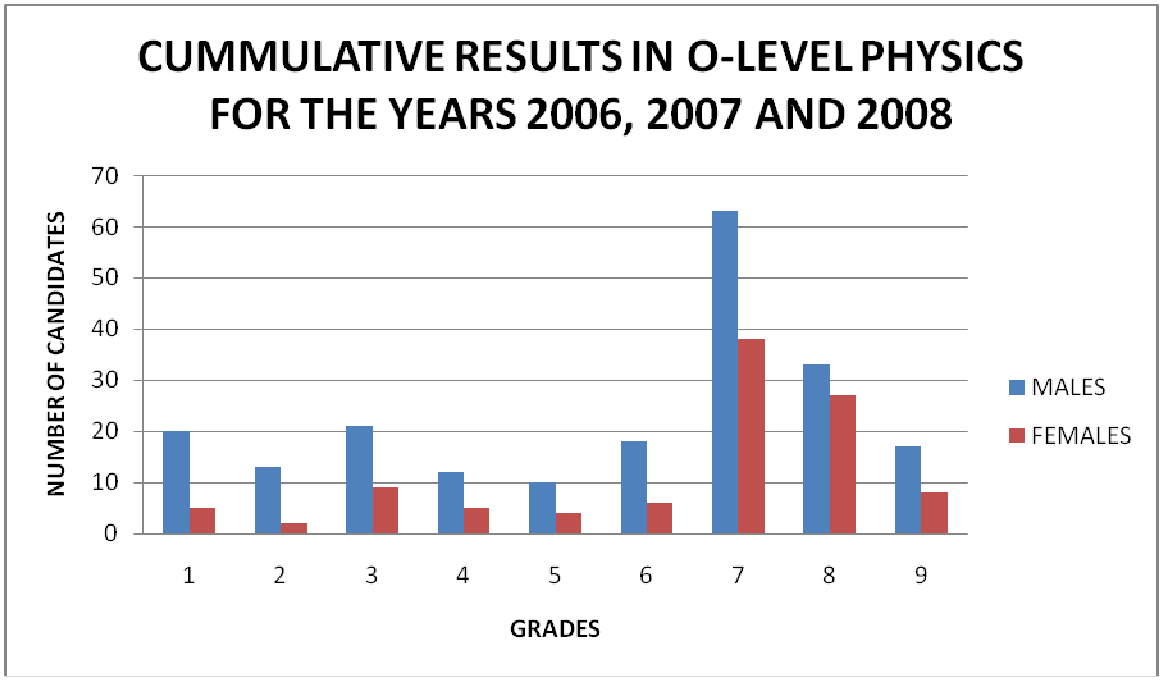
In 2007 out of 31 females candidates who sat for the examination only 97% (N=30) passed. Out of 30 candidates 63% (N=20) obtained grades 7 and 8 leaving only 32% (N=12) with quality grades. At the same time out of 96 males who sat for the examination, 93% (N=89) passed. Out of 89 candidates 66% (N=59) obtained 7 and 8 leaving 42% (N=37) with quality grades.

Chart 3 Bar chart on the performance of learners by gender in physics for the year 2008



In 2008 out of 35 females candidates who sat for the examination only 91% (N=32) passed. Out of 32 candidates 72% (N=23) obtained grades 7 and 8 leaving only 28% (N=9) with quality grades. At the same time out of 67 male who sat for the examination 90% (N=60) passed. Out of 60 candidates 43% (N=26) obtained 7 and 8 leaving 57% (N=34) with quality grades.

Chart 4 Bar chart on the performance of learners by gender in physics for the years 2006, 2007 and 2008.



Between 2006 and 2008 out of 104 females candidates who sat for the examination only 92% (N=96) passed. Out of 96 candidates 68% (N=65) obtained grades 7 and 8 leaving only 32% (N=31) with quality grades. At the same time out of 207 males who sat for the examination 92% (N=190) passed. Out of 190 candidates 51% (N=96) obtained 7 and 8 leaving 49% (N=94) with quality grades.

The charts presented show that female learners are not performing as well as their male counterparts.

Question four: What factors affect performance of females in Physics during O-level examinations?

The study tried to establish views held by school managers, teachers and learners to as what causes under achievement in female learners at O-Level physics examinations. Analyzing

respondents' views on causes of under achievement brings about measures to be employed to improve the performance of learners.

The research revealed that Head Teachers were all degree holders with 90% (N=9) in social sciences and 10% (N=1) in natural science. This finding is consistent with the findings of Kostyuk (2004), who pointed out that "Physics educators are scarce in senior posts like in the directorship". This finding was also in line with the finding of Muwanga-Zake's study in South Africa. Muwanga-Zake (2000), 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".

The Head Teachers viewed causes of under achievement to lack of qualified teachers. Most teachers that teach physics were diploma holders trained to teach Environmental Science. Sometimes seconded teachers who were not qualified to teach physics are made to teach physics because they had a good grade in mathematics and physics at O-Level. These teachers lacked the subject content of physics in certain topics and because of that, they failed to impart the necessary knowledge and skill much needed by the learners during the examinations. This finding was also consistent with Kayungwa (2002). Darling-Hammond (2002) argues that assigning teachers to teach courses that they are not trained to teach has a negative effect on students achievement than qualified teachers who are more effective in the classroom and their students demonstrate more achievement gains than students whose teachers are not fully prepared. The government's failure to avail schools with well qualified physics teachers, well stocked and working laboratories, instructional materials and adequate funding to institutions made administering of physics courses and examinations very difficult. With lack of good funding Head teachers found administrative work very difficult as resource allocated to the Natural Science department would not be sufficient for the experiments or hands-on activities during lessons. In cases where most of the requirements for the department were not available internal monitoring from school administration was almost inexistence. .

The research also revealed that out of the teachers interviewed 20% (N=2) were qualified to teach O-level physics. This finding was consistent with the findings of Haambokoma et al

(2002), and Kostyuk (2004), who stated that only 20% of teachers were qualified to teach physics.

The research also revealed that teachers were performing poorly because among other reasons, there were inadequate teaching and learning materials. Other than materials the research also revealed that teachers of physics suffer from huge teaching loads of about 30 periods per week. Caritas Convent School in Kabwe could serve as an example where each teacher in the department has an average of 51 periods per week. This scenario dampens the morale of teachers of physics. This finding is also in agreement with kostyuk (2006) who found out 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 as the teacher to pupil ratio is too high". The study also revealed that another demotivating factor for the teacher is that the teaching loads are very high as the teachers of physics are very few. For example at Caritas Convent School in Kabwe they are only 3 teachers of science against 153 periods for science in school. The average number of periods per person per week is 51 against the 40 periods for the entire school per week. High teaching loads lead to teachers failing to handle JETS club effectively. JETS helps in linking physics and the learner. In addition, high teaching loads has lead the teachers failing to innovate experiments that would substitute those that have no apparatus or equipment available in school.

The research further revealed that one of the prime reasons for lack of success in O-level physics examinations is lack of working laboratories. The teachers were holding the view that their poor performance was due to lack of inadequate hands on in science lessons. Due to lack of working laboratories the teachers were observed to using mostly lecture method when teaching hence failure to develop in the learner the skill and techniques needed in the examination. This finding is in agreement with those of Kayungwa (2002) who stated that "students' achievement increases when students have teachers who are trained in developing higher thinking skills and skilled at implementing hands on experiences in the classroom".

Physics syllabus (CDC, 2000), has been realised to be too long for a comprehensive coverage of topics. Nevertheless it encourages the development of scientific inquiry and problem solving skills, Haambokoma et al (2002) and kostyuk (2006). The problem is not only the length of the

syllabus but also the competence of the teachers. With the mushrooming of colleges and universities the quality of a graduate science teacher has been compromised. For instance a graduate from Azalia basically learnt the science courses theoretically when given to teach certain topics in physics faces certain challenges which creates a vacuum in learners potential to perform better. Kostyuk (2004), states that "A determinant of students' 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".

In the case of the junior secondary school, learners lack experience in science due to differential teacher behaviour towards males and females taking environmental science. The teachers tend to portray that boys would perform better than the girls in physics. Most concentration is given to boys and this in turn makes girls develop negative attitude towards the learning of physics. This negative attitude cause most females to develop low self concept. This is in agreement with Carmony (2004), who says that part of the reason why women are at 5% in science based courses in universities is almost certainly related to the low self concept which girls assume in subjects like Mathematics, Chemistry and Physics.

According to Kostyuk (2004;87) the number of students who take up pure physics has reduced from about 23% in 1986 to about 16% in 1997. This trend has continued to date.

Enrolments in physics is generally low as observed from co-education schools that recorded low numbers of learners in physics both in males and females. In single sex school it was higher though in some cases lower than a class of 35, for example in 2010 Bwacha high school co-education had only one male learner in physics and zero female learner while Caritas girls school had 31. It was further observed that most schools encouraged low enrolment in a pure physics class as they would allow a class of 40 to take up physics lessons from grade 10 to 12 but ensuring only a few learners to write the O-Level Physics examination. This did not give a true reflection of how learners performed in physics examination because only those that were referred to "as gifted" were allowed to sit for the O-Level physics examination. Some teachers and pupils attributed failure to lack of experiment practice during the whole physics course because laboratories had been converted to ordinary classrooms. This meant that learners were only exposed to experiments during the final examinations.

Culture of reading books is dying slowing because of the learners of today prefer listening to music or watch musical programmes on T.V. The spend long hours watching T.V and pay too attention to channels that provide educative materials. This agrees with Cohen (2000:258), who says that, "children spent a lot of hours viewing T.V". It implies that the learners today do more of listening to reading.

The use of the computers and internet in teaching and learning environment is a good initiative though most learners tended to misuse the facility. They find themselves playing games on the computers instead of researching using Encarta Microsoft. In addition internet was being used for chatting on facebook, twitter, Badoo or as a form of entertainment instead of being used for academic purposes. The dying culture of reading books and the new culture of listening and watching of T.V has had a big impact negatively on performance of the female learners in O-level Physics examinations.

5.2 Conclusion

The study revealed that female learners in Zambia perform badly in O-Level Physics both in class exercises and at national examinations. This scenario is observed in the findings where teachers still follow the traditional scope of sequence approach to curriculum (Haambokoma, 2002), that has failed to produce learners that purport to be high order thinkers and maintain problem solving abilities. It was further noted that, the introduction of education for all those who obtained a full certificate at grade 9 to be enrolled into grade 10 dampened the interest in most female learners of learning physics, in that, the classes swelled up to 60 - 70 learners per class. Rally classes were not easy to handle in physics with very limited equipment and apparatus. Such classes were demotivating to female learners that needed individual attention. As for the teacher failing to offer remedial work for the slow learners due to the size of the class and the number of periods allocated to his or her time table. Coupled with the above factors teachers felt that they were subjected to the same pay with other subject areas that were less demanding in preparation and presentation.

The study also revealed that all stakeholders contribute greatly to the under achievements in the female learners despite them having positive perception of physics. Female learners with the

right foundation of science at primary and basic level would develop positive perceptions and strong attitudes towards physics and this in turn would make them perform better in the subject.

In conclusion, the researcher discovered that female learners had positive perceptions and strong attitudes towards physics. It was however the mathematics, professional and academic competence of the teachers of physics that was a determinant to the learners' poor performance. Offering equal opportunities to both male and female learners in the Science curriculum alone may not be the answer to the prevailing situation. It is important to identify factors that may affect the different groups of either sex of learners in the learning of physics. The current study therefore was designed to establish the factors that were contributing to under achievement of Zambian female learners in O-level physics examinations.

It should be obvious that the current study of Physics, learners' perceptions, attitudes, beliefs, teachers education physics teaching and learning has established a place for itself within Physics research. Research has produced information that can be used as a driving force for stakeholders in school Physics developers.

5.3 Recommendations

5.3.1. Improve the existing infrastructure in school and restock the laboratories that the serve the intended purposes. The discrepancy in terms of science infrastructure, school managers' views, and head of science department's views on under achievement in physics could be used as a point of reference for improvement. Policy makers needed to ensure that national planners avail adequate resources to schools so that physics teaching/learning receives the much attention it deserves.

5.3.2. Planning should include the preferred working environment for physics teacher and implementation of the physics curriculum. School administrator must use planning as a starting point for physics results and in turn help learners to learn better.

5.3.3. The teacher should be innovative and provoke critical thinking in class. This would in turn reduce the discrepancies between the school administrators' views and those of the teachers on under achievement at O-Level Physics examination.

5.3.4 Teachers of physics should vary their methodologies of teaching to promote positive

perception and attitude towards physics as it would inculcate interest in the learner.

5.3.5 Apart from the deepening the knowledge teachers of physics should be creative during the lessons and to initiate critical and logical thinking in the learner.

5.3.6 In addition to school based Continuous Professional Development (CPD) workshops held every holiday, Ministry of Education (MOE) should encourage teachers to conduct mini lessons on new topics in physics during ZASE conferences. Administrators should fund the C.P.Ds held within the institutions so that they would equip teachers both in content and skills.

5.3.7 The physics syllabus should be revised so that it is not too long to allow a lot of practice in class.[For areas that are new in the syllabus let the government deliberately introduce short courses to equip teachers with the content on such topics.]

5.3.8 All physics teachers should be computer literate so that they can use e-learning as an Aids to teaching. In this case it is inevitable that each school that is offering physics be connected to internet.

5.3.9 The government should organize facilitators to make videos/DVDs of mock classes for topics that are difficult to teach. These videos/DVDs can then be acquired by teachers and be used to enhance learning in class. For cases where experiments cannot be done due to lack of apparatus, these videos/DVDs should be able to demonstrate by animations such experiments.

5.3.10. Since there is an educational radio programme on Radio 2 of ZNBC which is helping learners in the country, a similar programme should be initiated in physics on radio and on TV.

5.3.11. Teachers of science should be paid more than teachers of other subjects because they are exposed to so many risks and challenges compared with other subject areas.

5.3.12. Both the teachers and learners must be highly motivated by ensuring that field trips are under taken to enhance what is taught in class and being actively involved in JETS activities. At the same time they must be highly motivated in terms of teaching/learning environment and teaching/learning materials.

5.3.13. Encourage more pupils with a strong inclination to science to take up physics.

5.3.14. Impart the necessary mathematical pre-requisite and co-requisite skills needed by the science teachers and learners before the teachers leave higher institution of leaving.

5.3.15. Improve on staffing levels, preferably, deliberate posting of science teachers to schools with a deficit and retention and rewarding the few available teachers based on performance in class.

5.3.16. There should be proper sensitization of the importance and benefits of physics to communities and female learners. Parents should encourage the female learners to take up physics as a stepping stone to becoming engineers, miners, and teachers of physics. Government should come up with a deliberate policy of investing in science and technology and start giving bursaries to female learners performing well in science starting from basic schools.

5.3.17. There should be provision of equipment and apparatus needed for physics lessons and examinations all the time in schools.

5.3.18. Basic school teachers handling grade 8 and 9 should be qualified enough to teach mathematics and environmental science.

5.3.19. Girls should be encouraged to be more assertive, forthcoming and to show more confidence in class.

5.3.20. Female staffing ratio should be improved so that more women can be used as science and technology teachers as well as role models.

5.3.21. Education systems should teach science and technology from nursery school making use of female teachers.

5.3.22. MOE should introduce problem solving approach at nursery school. Learners at an early age should be exposed to basic scientific and technological principles, which will help them understand the world they live in.

5.3.23. MOE should introduce a policy that will run from grade one to eleven. In that policy a learner must not be permitted to proceed to the next grade if their performance in English, Mathematics and Science is not meeting the required level.

5.3.24. Pupils enrolled in grade 10 for physics classes should be allowed to sit for the O-Level Physics examination when in grade 12.

5.3.25. During National planning the three sciences should be treated independently if any Significant improvement is to be noted in Physics Education.

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APPENDIX 1

FACTORS CONTRIBUTING TO UNDER ACHIEVEMENTS OF FEMALE STUDENTS IN O-LEVEL PHYSICS EXAMINATIONS: A CASE OF SELECTED SCHOOLS IN CENTRAL PROVINCE

INTERVIEW SCHEDULE FOR HEAD TEACHERS

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF MATHEMATICS AND SCIENCE

QUESTIONNAIRE NO._____

IDENTIFICATION DATA (FOR OFFICIAL USE)

DISTRICT: _____

SCHOOL: _____

NAME OF INTERVIEWER: _____

SEX OF RESPONDENT: _____

TITLE OF RESPONDENT: _____

Q1. What is your highest qualification?

Diploma ☐

Advanced diploma ☐

Bachelors Degree ☐

Masters Degree ☐

Other (Specify) _____

Q2 What is your subject of specialization: _____

Q3 How long have you served as head teacher? _____

Q4 How long have you worked for this school? _____

Q5 How many teachers of physics do you have at your school? _____

One ☐

Two ☐

Three ☐

Four ☐

Five ☐

Q6 Is it your first time to head a school which offers physics as a subject?

Yes ☐ No ☐

Q7 How was the Head of Science Department appointed?

Recommendation ☐

Advertisement ☐

Q8 Was the HOD of science given orientation/training after he/she was appointed?

Yes ☐ No ☐ I was not there ☐

If the answer is Yes go to Q9

If the answer is No go to Q10

Q9 What kind of orientation was given?

(a) Administration and supervision ☐

(b) General Management of department ☐

(c) Specific instructions on Management of science department ☐

(d) Other (Specify)_____

Q10 Who provides materials for use in the teaching of physics?

(a) Users fees ☐

(b) School PTA/Board ☐

(c) District Educational Board ☐

(d) The Provincial Educational Office ☐

(e) Ministry Headquarters ☐

(f) Other (Specify)_____

Q11 How often are there materials provided?

(a) Once per term ☐

(b) Twice per term ☐

(c) During the final examination preparation ☐

(d) During common mock and final examination preparation ☐

(e) Whenever needed ☐

12. How are the pupils selected for O-level physics classes

……

……..

13 a. Do you think the failure rate in physics Examinations is a source of concern for the schools?

(i) Yes ☐ (ii) No ☐

13 b. Give reasons for your choice of answers

……..

……..

……

14. What do you think is the major cause of this underachievement in O-level physics examination for female student?

……

……

……

15. Do you easily access physics teaching and learning materials for purchase

(i) Yes ☐ (ii) No ☐

16. Do you find teaching of physics in your school expensive to manage?

(i) Yes ☐ (ii) No ☐

17. How often does the department conduct cost associated lesson practicals in Physics?

(i) Every lesson ☐

(ii) Once a weak ☐

(iii) Once a month ☐

(iv) Once a term ☐

(v) Once a year ☐

(vi) Seldom ☐

18. Have you had an experience of missing physics materials equipment and apparatus from the department

(i) Yes ☐ (ii) No ☐

19. Comment on your choice of answer

……..

……..

……..

20. What has the school put in place to motivate the teacher of physics?

……

……..

……..

21. What steps has the school taken to motivate pupils taking physics at O-level?

……

……..

……..

Thank you for answering this questionnaire

APPENDIX II

FACTORS CONTRIBUTING TO UNDER ACHIEVEMENTS OF FEMALE STUDENTS IN O-LEVEL PHYSICS EXAMINATIONS: A CASE OF SELECTED SCHOOLS IN CENTRAL PROVINCE

INTERVIEW SCHEDULE FOR HEAD OF SCIENCE DEPARTMENT

THE UNIVERSITY OF ZAMBIA

DEPARTMENT OF MATHEMATICS AND SCIENCE

QUESTIONNAIRE NO._____

DISTRICT: _____

SCHOOL: _____

NAME OF INTERVIEWER: _____

SEX OF RESPONDENT: _____

TITLE OF RESPONDENT: _____

Q1 How long have you been teaching?.....

Q2 How long have you worked at this school?.....

Q3 How long have you worked as Head of Department?.....

Q4. What is your highest educational qualification?.....

(a) Certificate ☐

(b) Diploma ☐

(c) Advanced diploma ☐

(d) Degree ☐

(e) Masters Degree ☐

(f) Other (Specify) _____

Q5 What is your area of specialization?.....

Q6 How many teachers are there in your Department?

(a) One ☐

(b) Two ☐

(c) Three ☐

(d) Four ☐

(e) Five ☐

(f) more than five ☐

Q7 How many physics teachers are there in the Department?

(a) One ☐

(b) Two ☐

(c) Three ☐

(d) Four ☐

(e) Five ☐

Q8 What is the average number of periods per teacher in the Department?

Q9 How were you appointed as Head of Department?

(a) By recommendation ☐

(b) By advertisement ☐

10. List down the course you under took during your training

INITIAL TRAINING	2ND TRAINING	3RD TRAINING

Q11 a Do you have physics Laboratories?

(a) Yes ☐

(b) No ☐

Q11 b. How well are these Laboratories stocked?

(a) Well Stocked ☐

(b) Fairly stocked ☐

(c) Poorly stocked ☐

(d) No stock is here ☐

Q12 Is it possible to teach physics without materials and apparatus for practicals?

(a) Yes ☐ (b) No ☐

Q13 Are teaching and learning materials available for teachers use during lessons?

(a) Yes ☐ (b) No ☐

Q14 How do you replace worn out material and apparatus?

……

……..……..

Q15 Do you have a person employed as laboratory assistance?

(a) Yes ☐ (b) No ☐

Q16 Do you conduct lessons observations to your physics teachers?

(a) Yes ☐ (b) No ☐

Q17 Do you think the performance in physics examinations in your school is a source of concern?

(a) Yes ☐ (b) No ☐

Q18. What factors contribute to the poor performance in Physics?

1 ……..

2. …….

3. …….

Q19. What measures have you put in place to help reduce failure rate in physics examinations in your school?

1 ……..

2. …….

3. …….

Q20. Does the geographical location of the school affect the supply of procurement of physics teaching and learning materials?

1 ……..

2. …….

3. …….

Q21. Give reasons to your answer in Q20

1 ……..

2. …….

3. …….

End of questionnaire

Thank you very much for your co-operation

APPENDIX III

FACTORS CONTRIBUTING TO UNDER ACHIEVEMENTS OF FEMALE STUDENTS IN O-LEVEL PHYSICS EXAMINATIONS: A CASE OF SELECTED SCHOOLS IN CENTRAL PROVINCE

Questionnaire for Teachers of physics

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF MATHEMATICS AND SCIENCE

Questionnaire No……..

Dear Respondent:

The purpose of this Research is to determine the factors contributing to under achievements of females students in O-level physics Examinations. It is purely on academic exercise and please be as honest as possible. The information will be treated confidentially.

Please do not write your name.

Q1 District:……

School ……

Sex of respondent: Male ☐ Female ☐

Age:……

Q2 How long have you served as a teacher?.....

Q3 What is your qualification?

Masters degree ☐

Bachelors degree ☐

Advanced Diploma ☐

Diploma ☐

Certificate ☐

Q4 Tick ( ) the courses you under took during teachers Training

SUBJECT	INITIAL TRAINING	2ND TRAINING	3RD TRAINING
Physics			
Chemistry			
Biology			
Mathematics			
Science			
Administration Management			

Q5 Are you a member of ZASE (Zambia Association for science Educators?

Yes ☐ No ☐

Q6 If answer in Q5 is No give reasons.

……

……

……

Q7 Where are the physics apparatus, materials and equipment kept?

……..……

……

Q8 What is the source of the physics apparatus materials and equipment you use for physics lesson and practical lessons?

……

……

Q9 Is the performance in physics examinations in your school a source of concern?

Yes ☐ No ☐

Q10 Suggest ways which could help to improve the poor performance in physics examination

……

……

Q11. What problems do you encounter while conducting physics lessons in the laboratory?

……

Q12. How many students are in your class?

60 – 70 ☐

50 - 60 ☐

40 – 50 ☐

30 – 40 ☐

Q13. Which of the following do you use to

- Cultivate pupils' physics thinking habits?
- Teach physics using a logical system
- Design a series of questions and explain them step by step
- Guide the students' experiments and discussion

  Teach them how to analyse physics questions.

Q14 Do you arouse students' interest during your physics lesson?

Yes ☐ No ☐

Q15 Give reasons to your answer in Q14.

…..…….

……..

Q16 How do you usually make students concentrate their attention in class?

- Ask questions frequently. ☐
- Demonstrate many experiments ☐
- Remind students to pay more attention to what is being taught ☐
- Have students do individual experiments ☐

Q17. What is your attitude towards girls classroom discussion?

- Seldom carry them on for fear of classroom disorder ☐
- Let them fully express their opinion's within the given time. ☐

- First give them work, then correct their answers in the process of discussion ☐
- Give work after discussion the answers in class. ☐

Q18 What is your view on the performance of the girl in your physics class?

- Can not achieve highly because physics is abstract. ☐
- Physics is difficult for them ☐
- As low achieves because the are lazy. ☐

Q19 What qualification is primary for a good secondary school physics teacher?

- Diploma physics knowledge ☐
- Diploma physics knowledge, child psychology and pedagogical skills
- Degree physics knowledge ☐
- Degree physics knowledge, child psychology and pedagogical skills

Q20 Have you published ☐ science article in the ZASE newsletters.?

Yes ☐ No ☐

Thank you very much for your participation

APPENDIX IV

FACTORS CONTRIBUTING TO UNDER ACHIEVEMENTS OF FEMALE STUDENTS IN O-LEVEL PHYSICS EXAMINATIONS: A CASE OF SELECTED SCHOOLS IN CENTRAL PROVINCE

Questionnaire for learners of physics

THE UNIVERSITY OF ZAMBIA

SCHOOL OF EDUCATION

DEPARTMENT OF MATHEMATICS AND SCIENCE

Questionnaire No……..

Dear Respondent:

The purpose of this Research is to determine the factors contributing to under achievements of females students in O-level physics Examinations. It is purely on academic exercise and please be as honest as possible. The information will be treated confidentially.

Please do not write your name.

		Strongly disagree	Disagree	Neutral	Agree	Strongly agree
	I do not answer question in class because I can not speak good English language.					
	I do not finish my work in class because I do not clearly understand the questions					
	I find it difficult to learn physics because the teacher uses scientific terms which					
	I don't feel comfortable in the physics laboratory because this is more males doing activities than for females					
	I do not usually have a chance to learn physics in the laboratory at this school					
	Physics in interesting to learn					
	I enjoy my physics classes					
	Physics has many challenge topics to learn					
	Physics is difficult to learn because of too many formulae to remember.					
	Physics has a lot of information which seems to be abstract					
	The mathematics in physics makes it more demanding than other science subjects.					
	Physics is the subject in school I like most					
	Physics is easy to understand but the mathematics in it makes it difficult.					
	Physics is for boys only					
	Physics is useful in our daily life					
	Physics is for the mentally gifted only.					
	Physics is worth doing whether or not I want to pursue a career in science/ technology					
	O-level physics should be done by everyone……					
	I don't like attending physics lessons all the time					
	My parents feel that physics is not important in my life					
	My teacher of physics feels that I would not pass my physics exam.					
	I want to study physics beyond grade 12					
	Success in Physics gives many opportunities to succeed in my career					

	I review the physics notes before class defines because am afraid of the physics teacher's question					
	The physics teachers makes lessons very easy to understand					
	I skin through the physics note book					
	I enjoy my physic classes that books experiments					
	I concentrate a lot in class when my teacher demonstrates experiments					
	I like a physics teaching because they vivid examples in life.					
	Physics is worth doing whether or not you want to be a physicist					
	It takes me longer to understand physics than other subjects.					

APPENDIX V

Factors contributing to under achievements of female students in o-level physics examinations; A case of selected schools in central Province.

Group interview schedule for teachers of physics

1. How is the performance of pupils in physics at this school?
2. Is it good/bad performance by learners
3. How do you think learner regard physics?
4. How do learners react to the learning of physics
5. What causes learners to react in this way?

APPENDIX VI

Factor contributing to under achievements of female student in O-level physics Examinations: A case of selected schools in Central Province

Group Interview schedule for learners.

1. Which subject do you like most to learn?
2. Why do you like this subject?
3. Is physics a good subject to learn? Give a reason for your answer.
4. When it is time to learn physics, how to you feel.

APPENDIX VII

DATA COLLECTION SHEET

O-LEVEL PHYSICS EXAMINATIONS GRADES FOR FEMALES CANDIDATES IN SELECTED SCHOOLS IN CENTRAL PROVINCE YEARS 2006

SCHOOL	NO REGISTERED	NO SAT	GRADES									NO PASSED	NO FAILED	QUALITY PERCENTAGE
			1	2	3	4	5	6	7	8	9			

APPENDIX VII

DATA COLLECTION SHEET

O-LEVEL PHYSICS EXAMINATIONS GRADES FOR FEMALES CANDIDATES IN SELECTED SCHOOLS IN CENTRAL PROVINCE YEARS 2007

SCHOOL	NO REGISTERED	NO SAT	GRADES									NO PASSED	NO FAILED	QUALITY PERCENTAGE
			1	2	3	4	5	6	7	8	9			

APPENDIX VII

DATA COLLECTION SHEET

O-LEVEL PHYSICS EXAMINATIONS GRADES FOR FEMALES CANDIDATES IN SELECTED SCHOOLS IN CENTRAL PROVINCE YEARS 2008

SCHOOL	NO REGISTERED	NO SAT	GRADES									NO PASSED	NO FAILED	QUALITY PERCENTAGE
			1	2	3	4	5	6	7	8	9			