Identifying Problems Challenging the Academic Performance of Students in Physics at Preparatory Schools in Arsi Zone

(The case of Bekoji, Hetosa, Tiyo and Sagure Preparatory Schools)

By

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Adama, Ethiopia

August, 2018

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A Thesis Submitted to Adama Science and Technology University in Partial Fulfillment of the Requirement for the Degree of Masters in physics

Adama, Ethiopia

August 2018

ADAMA SCIENCE AND TECHNOLOGY UNIVERSITY
SCHOOL OF APPLIED NATURAL SCIENCE
DEPATMENT OF APPLIED PHYSICS

DECLARATION

I hereby declare this thesis on the title *"Identifying Problems Challenging the Academic Performance of Students in Physics at Preparatory Schools in Arsi Zone (the case of Bekoji, Hetosa, Tiyo and Sagure Preparatory Schools)"* is my original work and that all sources used for the thesis have been indicated and acknowledged with complete references. It has not also been submitted for any assessment at Adama Science and Technology or any other university or institution.

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This is to certify that the thesis prepared by Nigusu esfaye entitled " Identifying Problems Challenging the academic performance of students in physics at preparatory schools in Arsi Zone (the case of Bekoji, Hetosa,Tiyo and Sagure Preparatory schools)" Submitted in partial fulfillment of the requirement for the degree of Master of Science in physics complies with regulation of the University and meets the accepted standards with respect to originality.

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Acknowledgements

I would wish to acknowledge the following people without whose contribution this work would not have made the light of the day. Firstly I am greatly indebted to Dr. Megersa Wodajo my advisor for his constructive comments and timely guidance on my research paper. Then, physics teachers, school directors and students in Arsi zone who participated in the study by giving information for the success of the study. My heart also reaches out to my friends and classmates for their constant encouragement.

In addition, my deepest gratitude goes to my friend Esayas Bekele who helped me proofread the thesis.

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Acronyms

MOE- Ministry of Education

ICT – Information Communication and Technology

SD- Standard Deviation

SPSS- Statistical Package for Social Science

EGSECE- Ethiopian General School Education Certificate Examination

CPD- Continuous Professional Development

SES- Socio Economic Status

Abstract

This study was conducted to identify problems challenging the academic performance of students in some selected preparatory schools in Arsi zone. The respondents for this study were 110 natural science preparatory school students, physics teachers, physics department heads and school principals. The samples of the study were selected through cluster sampling method and ratios were calculated for the strata. The instruments used to collect data were the questionnaire, semi-structured interview, document analysis and observations for information gathering about different factors relating to academic performance of students. The data gathered through closed-ended items were coded, tabulated and analyzed using descriptive statistics such as frequency, mean and standard deviation, whereas, the additional data gained from semi-structured interview, documents and observations were also coded, categorized and identified thematically in order to approve or disapprove the quantitative data. SPSS were applied to investigate the effect of different factors on students' achievement. The results of the study revealed that students back ground, entry behavior, attitudes to the subject , inadequate use of resource in the teaching and learning process ,students characteristics, negative socio-cultural factors, parents' and per influences were the main causes of the students' persistent poor performance in physics in Arsi zone preparatory schools. Based on the findings, it is recommended that the Ministry of Education through its various agents should, among other things, enhance supervision of entry behavior of students in preparatory schools, increase the amount allocated for tuition and release the funds in good time to enable prompt acquisition of laboratories and learning materials. Motivational talks by physics professionals and Observation of physics-based industries as a way of motivating the students to help change negative attitude and to build positive attitude of students towards the subject. School managements, in conjunction with other stakeholders, should enhance students and teacher motivation and provide more and better teaching and learning facilities to enable a more conducive environment for learning. Finally, physics teachers must motivate the students to perform better in the subject.

Chapter 1 : Introduction

This chapter incorporates background of the study, statement of the problem, objectives, research questions, scope of the study, Significance of the Study, limitation and delimitation of the study, and organization of the study. These are discussed one by one.

1.1 Background of the Study

Science has become such an essential instrument that no nation, developed or developing, wishing to progress in the socioeconomic sphere will afford to transfer its learning in schools. The role of science in this modern era of technology is wide and profound. Education remains the only major avenue for upward social mobility (Amutabi, 2003). Its ultimate purpose is to empower an individual to excel in a chosen field of endeavor or career, and to be able to positively impact his/her environment. In line with this, Tegene and Tsegye (1999:1) discussed education as a process and practice engaged in by different societies at all stage of development and geared toward shaping an all rounded personality by a harmonious and integrated development of the mental, physical, social, moral, spiritual, aesthetic etc. power of human being.

All over the world, nations including Ethiopia are striving hard to develop technologically, since the world is turning scientific and all the proper functioning lives depend greatly on science. Owolabi (2004) defined science as an integral part of human society. According to YaseminGodek (2004:9), all the developing countries should accelerate the development of science education as learner-centered, teacher-assisted, action oriented, and project based education program. For rapid development of science education, government, society and industry should be in a co-operation and work together.

The significant role of science in the attainment of the Ethiopian development has prompted the Government of Ethiopia to make it compulsory for each student to specialize in at least two out of the natural science subjects (Chemistry, Biology Physics and mathematics) offered at the secondary and preparatory school level. Physics has been one of the basic sciences offered at preparatory school level in Ethiopia. Students have

nearly always had the option to choose the Natural science field or not when they join preparatory school. Physics is one of the subjects required for the study of Engineering, Medicine, Physical Sciences and other related courses in tertiary institutions. In order to have the adequate foundation and knowledge in physics that will be needed for the advancement and development of science and technology in our society, there is the need for physics students to have the right conceptions of the various physics concepts (ideas) they are been exposed to in schools in order to apply these knowledge to their day to day activities (Omosewo, 2007). This notwithstanding, performance in these science subject is not as it was expected.. The poor performances in sciences include physics, which is one of the most popular science subjects that have continued to register high student enrolment in preparatory schools. The perceived popularity of physics, it was hoped, would translate into better performance. But Students' performances in physics over the past decade have been very poor and not encouraging; as a breakdown of students' performance shows that there is a downward trend (Omoifo, 2012).

Up to date reported data from different researches at different levels realized the poor academic achievement of students in physics education to study as school subject /course in high school/ or higher education level. This erosion of low performance found to emerge as early as lower high school to later result in compromising college enrolment. (Hoffmann, L. 2002).

However, as some of facts have been revealed in some hard sciences, like physics, mathematics and chemistry, especially in physics, none of the students' attitudes towards the subjects at all levels have been declining. In this regard, a number of factors have been identified to underpin the low achievement of students in science in general and that of physics in particular. Recognizing the far reaching challenges, attempts have been made to bolster students' achievement in Physics. However, to date, little is known about the underlying factors that deteriorate physics achievement and aggravate disliking of studying physics among students. Identification of the underlying reasons is of significance to widen our understanding of the problems related to physics education and uncover possible differences across cultures. Hence, the present study intends to capture these factors in Ethiopia context taking Arsi zone as an example. Recently, the need for

competent human capital in science and technology in Ethiopia and the rising of developments urge to reform education policy. According to Ministry of Education [MoE] (2008), universities are expected to enroll 70% of their students in science and technology, of which, natural science stream taking about 40%. Most importantly, the majority of students assigned to study physics were blamed for lack of academic success due to low achievement even as compared to their counterparts assigned to Biology, Chemistry, and Mathematics. (Getnet T. 2006).

The Ethiopian National learning assessments also showed that compared to other subjects students' performance in physics to be the least in all grade levels. According to findings of researcher in this area Shibeshi, A., Mekonnen, D., Semela, T., & Endawoke, Y. (2009), rate of enrolment in physics is the lowest and applicants who were assigned to the physics undergraduate programs were those whose mean score in Ethiopian National Higher Education Entrance Examination was the lowest compared to any other group.

1.2 Statement of the Problem

Thought the year's developing countries performance in physics among secondary and preparatory school students has not being encouraging. Students' performances in physics over the years in external examinations have been very poor and not encouraging. The majority of students in the secondary schools, especially in grade 9 & 10 have been low interest to learn physics and this result the low achievement in EGSECE. In addition to this, the students in the preparatory grades (11&12), have been also low interest in physics when compared with other science subjects. Also statistics shows that majority of students scored very poor result in the entrance examination to higher educational institutions.

Besides this, teachers in these schools have been low motivation to teach physics, the reason could be due to some problems encountered in teaching and learning of physics. Poor scores in physics limit students' opportunities in competitive professional courses like engineering and information technology among others. Thus, the researcher extremely interested to identify problems that are challenging the academic performance of physics in some selected Arsi Zone preparatory schools, and to suggest possible solutions.

1.3 Objective of the Study

1.3.1 General Objective

- The general objective of the study was to investigate the main challenging problems that hinder students' academic performance in physics subject in governmental preparatory schools in selected areas of Arsi Zone.

1.3.2 Specific Objectives

- To identify the challenging problems of preparatory students in physics.
- To formulate the relation between interest to physics subject and academic performance.
- To look at the association between dependent (academic performance) and independent variables.

1.4 Research Questions

The study sought to answer the following questions:-

a) What are the effects of background characteristics on student's performance in Physics?
b) What are the students' attitudes towards Physics?
c) How do students perceive their Physics teachers?
d) Does the use of available resources affect students' achievement in physics?
e) What teaching techniques do teachers use to teach physics?

1.5 Significance of the Study

A poorly educated workforce directly hampers a nations productivity and economic competitiveness (Stevenson & Stigler, 1992). The findings were expected to practically contribute towards improvement of teaching and learning strategies of physics in preparatory schools. This study makes the following important contributions to knowledge and education.

- The study may help in giving appropriate solutions for the students, physics teacher and other concerned bodies to take measurements to overcome the problems.
- This study provides physics educators curriculum planners and government with detailed information about the actual picture of physics teaching in preparatory schools. This in turn can help in planning and formulating further policies.
- This study engages key stakeholders in science education in revealing the actual and ideal pictures and gaining their support for recommendations for closing the gap.
- The study will also help as for other researcher for further investigation of the problems.

1.6 Scope of the Study

The study was carried out in Arsi zone in the case of Bekoji Town, Tiyo, Sagure, and Hetosa woreda which is located the south Eastern part of Oromia and 229km, 175km, 185km, 150km far from Addis Ababa respectively in the academic year 2017/18. The study was delimited to figure out in identifying the Problems Challenging the academic performance of students in physics in these some selected Governmental preparatory schools. Hence, it was delimited to grade 11 and 12 physics teachers, students and school principals. This investigation does not include all the schools in the Zone.

1.7 Limitation of the Study

It would have been more full if the study had been conducted in all woredas in the Zone. But it was restricted only in four Woredas due to budget and time limitation. While conducting the study, the following challenges were faced during the study;-

- ✓ Shortage of materials and references related with the study to dig out all possible data for the study.
- ✓ The respondents were delayed in responding to information of the investigation.

1.8 Operational Definitions of Terms

Physics achievement: the competency level attained in physics including mastery of basic skills (observation, recording, reporting), knowledge and concepts measured in terms of grades a student scores at MOE level.

Achievement: this is performance of a student measured by the school administered test and national examinations.

Physics: the science that deals with matter, energy, motion, and force.

Woreda- the basic administrative place in Ethiopia.

Zone- one of the administrative areas next to Woreda in Ethiopia.

1.9 Organization of the Study

This paper consists of five chapters. The first chapter presents the introduction part of the thesis which comprises background of the study, statement of the problem, objectives, research questions, significance, scope, limitation of the study, operational definitions of key terms and organization of the thesis. The second chapter deals with the review of related literature which provides the reader with information related to Physics education, physics and society and performance of students in physics subject. The third chapter presents research design and methodology. The research design, setting, population and sampling, data collecting instruments, data collection procedures, data analysis and interpretation procedures are discussed in the chapter. The fourth chapter comes with the presentation, analysis and interpretation of data collected through questionnaires, document analysis, Observation and interview. Finally, the summary of the findings, general conclusions and recommendations are summed up in the fifth chapter.

Chapter 2 : Review of the Literature

This Chapter presents a summary of national and international research literature, curriculum documents and reports that are relevant to this investigation of on factors that affect students' performance in physics. A lot has been written on factors that determine performance of Sciences particularly in physics with the aim of improving their performance.

2.1 Physics Education

Modern society depends on advanced technology. Decisions ranging from the purchase of an energy-efficient air conditioner to legislation on nuclear power plants now routinely confront the public. Almost all technology is based on scientific principles, and providing people with technical knowledge and scientific literacy in a range of fields is one of the most important missions of the physics community (The National Academics of Science Engineering Medicine, 2001). An education accessible and engaging to a broad spectrum of students at all levels is essential for this mission. The reasons for teaching physics may be cultural or economic, national or personal. Some will teach physics nearly because they enjoy doing so and find it intellectually satisfying (William Clowes & Sons Ltd, 1972). Graduates who have specialized in physics provide a unique component of the technical workforce. With their problem-solving skills and grasp of the principles of physics, they are able to attack a wide variety of problems. A well-trained physicist is capable of moving quickly among different technical areas, particularly into areas so new that they have not yet evolved into an engineering discipline. Excellence in high school physics depends on many things: the teacher, course content, availability of apparatus for laboratory experiments, a clear philosophy and workable plan for meeting students' needs, serious dedication to learning goals, and adequate financial support (The American Association of Physics Teachers 2009). In the study of conventional teaching and traditional teaching methods, results shows that in order to increase the level of attitude and success in physics education, new teaching methods and technology need to be implemented into physics education (Prof. Ryan Manuel D. Guido, 2013)

2.2 Physics and Society

Our knowledge of physics has produced industry, tools and devices, and new forms of transport, as well as new means of destruction. Physics has affected thought in other spheres and through technology has revolutionized peaceful industry and methods of war. It has shaped history. These are some of the reasons why physics should be part of education at the secondary level (William Clowes & Sons Ltd, 1972). As Physics in a new Era(2001), with physics now connected strongly to the other sciences and contributing to many national needs, education in physics is of vital importance. Physics is at the heart of the technology driving our economy, and broad scientific literacy must be a primary goal of physics education at all levels. To achieve this goal, to provide an education linked to the wider world that is so important for members of the high-tech work force, and to draw more students into careers in science will require the best efforts of university physics departments and national laboratories.

It is an international society that physics and physics education must reach in this new era. The problems that physics can address are global problems, and physics itself is becoming a more international enterprise. New modes of international cooperation must be created to plan and operate the large facilities that are increasingly important for frontier research.

2.3 The Academic Performance

According to Daniels, M. and Schouten, J. (1970) definition academic performance has been described as the Scholastic standing of a student at a given moment. This scholastic standing could be explained in terms of the grades obtained in a course or groups of courses. Al-Shorayye, S.R. (1995) commented on this scholastic standing an argued that performance is a measure of output and that the main outputs in education are expressed in terms of learning, that is, changes in knowledge, skills and attitudes of individuals as a result of their experiences within the school's system. Academic performance is regarded a student's performance in an examination as being depended on his cumulative grade point average**.**

On the other hands, Poor academic performance is a performance that is adjudged by the examinee and some other significant as falling below an expected standard. The interpretation of this expected or desired standard is better appreciated from the perpetual cognitive ability of the evaluator of the performance. This review considers the following as probable factors that could determine a students' performance.

a) Attitude and performance

It is said that everything a man becomes in life, is a product of his attitude. Thus, the level of honesty, hard work, tolerance, team spirit, forbearance, humility, etc which he possesses and exhibits, sets the limits of success or failure of the man. To define what exactly an attitude is, many attempts have been made in literature. Generally it is defined as a complex mental state involving beliefs (Hussain, Ali, Khan, Ramzan & Qadeer, 2011). It is an individual's prevailing tendency to respond favorably or unfavorably to an object, person or group of people, institutions or events (Barros & Elia, 1997). Attitudes determine what each individual will see, hear, think and do. They are rooted in experience and do not become automatic routine conduct. Attitudes can be positive (values) or negative. Prof. Ryan Manuel D. Guido (2013) Attitude can distort the perception of information and affect the degree of their retention. Also, it affirmed that students' attitudes and interest could play substantial role among pupils studying science, and attitude implies a favorable or disfavorable evaluative reactions towards something, events, programmes, etc. exhibited in an individual's beliefs, feelings, emotions or intended behaviors. It also shows that students' positive attitudes to science correlate highly with their science achievement.

Attitude towards science denotes interest or feeling towards studying science. Physics is an important science subject that makes immense academic demands on the students in its learning. Attitude in science means the scientific approach assumed by an individual for solving problems, assessing ideas and making decisions in the sciences (Olatunde, 2009).The learning of the physics is difficult at best and almost impossible at worst but because of its enormous importance to science and technology, there is huge interest in student's achievement in physics. In the light of this, the relationship between the

background and classroom environments and students achievement in physics has generated a great deal of discussion for a long time. It is the students disposition towards "like‟ or "dislike‟ in science. One reason that so many people have such a lack of familiarity with physics is the fact that very few people ever actually take a physics course. Generally, a negative attitude toward a given subject leads to lack of interest and, when subjects can be selected, as in senior high school, to avoiding the subject or course. Furthermore, a positive attitude toward science "leads to a positive commitment to science that influences lifelong interest and learning in science". This is one reason why major science education reform efforts have emphasized the improvement of students' attitudes. Several studies have identified a number of factors affecting students' attitudes towards science in general. These can be largely categorized as gender, personality traits, structural variables, and curriculum variables.

Teacher attitudes play a significant role in shaping the classroom environment which has an impact on a student's self efficacy which in turn influences a student's behavior. All of these factors which can be loosely categorized as environment, personal factors, and behavior interact and play off each other in a cyclical way (Woolfolk, 2007). Academic performance problems therefore have been the focal point for educators and researchers for quite some time now. This is because problems in the performance of students' school subjects are thought to be associated with their attitudes.

b) Students' characteristics and achievement

The personal characteristics of learners play an important role in their academic success. The student characteristics include: entry behavior, study time, peer group influence and aspiration. They vary from one individual student to the next. The feelings were found to be due to socio-cultural attitudes, teachers' attitude or predisposition towards the students, school culture, teaching methodology and performance. In addition to this, Students' educational outcome and academic success is greatly influenced by the type of school which they attend. The school one attends is the institutional environment that sets the parameters of a students' learning experience. Depending on the environment, a school can either open or close the doors that lead to academic achievement. This study will

intends to further this work and determine to what extent the students' characteristics might be contributing to the performance in physics.

c) Teacher characteristics and achievement

The role of teacher is very important in any teaching exercise especially since his/her direct participation can range from complete control over what is learned to minimal intervention. Teacher is the source of all knowledge that children acquire in class. Quality teaching is a backbone of any educational system for developing scientifically literate citizens. The National Policy on Education (FGN, 1998), notes, "no educational standard can rise above the quality of the teacher". The National Science Education Standards National Research Council, (1996) also asserts "what students learn is greatly influenced by how they are taught" . Therefore students cannot achieve high levels of performance in the absence of skilled, talented and dedicated professional teachers. A national inquiry report into teacher education in Australia Commonwealth of Australia, (1980) argues that quality teachers are responsive and sensitive to the distinctive educational needs of special communities and to the particular configuration of special education needs of each pupil. Other research into roles of quality teachers in classroom activities and processes OECD, 1994; Shulman, (1986) further indicate that quality teachers' demonstrate commitment; have subject specific content knowledge and knowing their craft; love children; set an example of moral conduct; manage group effectively; incorporate new technology in their teaching and students' learning; master multiple models of teaching and learning; adjust and improvise their practice; know their students as individuals; exchange ideas with other teachers; reflect on their practice; collaborate with other teachers in advancing the profession of teaching; and they also contribute to society at large.

Increasingly, the teacher's role involves being a mentor or guide, one who extends students' deep understandings, and also one who facilitates the acquisition of students' higher order thinking and creative problems solving skills (Abell & Pizzini, 1992). Basically, accomplished teachers of science are constructors, facilitators, open-minded and critical independent professionals, active co-operators and collaborators, mediators between learners and what they need to know, providers of scaffolding for understanding, coaches

and creators of learning environments and also have a rich understanding of the subject(s) they teach and appreciate how knowledge in their subject relates to other disciplines in helping learners to acquire knowledge (Association of California School Administrator,2000). Therefore, accomplished science teachers are those who engage students in higher cognitive skills, who promote information literacy, and nurture collaborative classroom practices among students.

According to Kwale SMASSE (2004), teachers are the most important agents that can influence change in students' attitude towards Mathematics and Sciences. They are in contact with the students most of the time. Through such contacts, they communicate their view point and expectations to students and the students are likely to faithfully believe them. According to Comber and Keeves (1973), teaching experience does not necessarily cause higher achievement in science, but knowledgeable teachers are less likely to pass on misconceptions, are more confident in imparting information, use less time for preparation and are able to present a wider range of examples and analogies which helps the students to comprehend concepts more easily. Experienced teachers elicit strong achievement gains and accept responsibility for doing so.

d) Teaching strategy

Effective teaching comes from the knowledge of the relationship between classroom process measured through observation of systems and student outcomes, most notably gains in standardized achievement test. If students are to learn science, we must give them respect for observation rather than the pronouncement of textbooks (Garson, 1988). This is more so important after the findings of Kwale SMASSE (2004), project baseline studies which found that most science teachers enter in to the activity of teaching armed only with textbooks.

According to Khatete (1995), constructivism brings about the desired outcome of conceptual change by creating a conflict between the student's naive ideas and the accepted scientific ideas. It is the role of the teacher to establish the students ideas in a given concept area then introduce analogies of accepted scientific concepts so that the student can compare their own conceptions with the accepted concepts. This may lead

to a better understanding of the scientific concepts hence greater achievement in sciences in this case physics. Therefore, when planning for teaching, the teacher must develop strategies that will make the process of learning more meaningful, the type of teaching and learning process that will make students change their unscientific conceptions. A teacher who exposes learners to a variety of experiences give them an opportunity to form, test and transfer concepts. It is by reflecting, exploring, testing, amending and revising our current concepts to meet new circumstances and experiences that we undertake meaningful learning.

e) Learning environment and achievement

Mieke.B, Pieter.V, Jan. Te and Theo. W (2001) From a resource theoretical perspective the process of learning mathematics or physics can be seen as a complex process of mobilization and exchange of resources. In the process of learning, the mobilization of a resource by a student can be accelerated or decelerated by resources belong- ing to the learning environment. The learning atmosphere found inside the classroom is of extreme importance in moulding the character of the students and determining the efficiency with which learning takes place. However, for this achievement, students need so many infrastructure facilities at school to acquire sufficient knowledge in their field (Maundu, Muthwii and Sambili, 2005).

f) **Resource availability, use and achievement**

The National Academics of Science Engineering Medicine,(2001), it is generally agreed that it is desirable, whenever possible, to get pupils to do experiments themselves in order to give them first-hand experience, so that they get the feel of science and learn to find out for themselves. 'Hear and forget, see and remember, do and understand' is widely accepted as the ideal for physics teaching. Talk and chalk alone give little feeling for science, encouraging an authoritarian factual approach. Gammage (1971) argues that in the context of classroom interaction, personality, as it is, affects learning. The teacher can make the students be eager to learn or inhibit their interest and attitudes. Education is being given to students with different methods namely Teaching, Demonstration, Laboratory Practice,

Field Study and etc. According to Maundu, Muthwii and Sambili (2005), a classroom teacher requires various kinds of teaching resources such as textbooks, apparatus, chemicals, charts, models, motion pictures as well as facilities such as laboratories and others to enhance the effectiveness of his/her instruction. A resource is any source of information, expertise, supply or support. Resources play an important role in enhancing the teaching /learning process by modifying the teaching and learning situation. Most of the resources play an important role in understanding concepts and imparting skills to the learner. The learner can only adequately acquire these concepts and skills through the actual use of or contact with the resources. Information Communication and Technologies (ICTs) provide a window of opportunity for educational institutions and other organizations to harness and use technology to complement and support the teaching and learning process.

In the same time, school is a place for good training and to provide facilities to students like effective teaching, suitable atmosphere, sufficient library and laboratory. Generally Students rely on the lecture notes, reference and text books study materials at large to maintain good performance in their studies now a day's, student's number in all Schools have been increased by Ministry of education but in the same time basic facilities are not being increased at the same rate. In this circumstances, the rapid growth of student's number in each schools, it is observed, certainly affects the availability of basic facilities on the other hand, Poor academic achievement in Physics could be attributed to many factors among which teacher's strategy itself was considered as an important factor (Nega, M. 2012). This implies that the mastery of Physics concepts might not be fully achieved without the use of instructional materials. The teaching of Physics without instructional materials may certainly result in poor academic achievement (Basses, M.P. 2002). This implies that the mastery of Physics concepts might not be fully achieved without the use of instructional materials

According to Meester and Kirscher (1995), the interrelationship between experiments, laboratory work, and practical activities is that student experiment is a subset of laboratory work, laboratory work in turn is a subset of practical activities, which in turn is a subset of the physics education curriculum. These relationships are shown in Figure 1

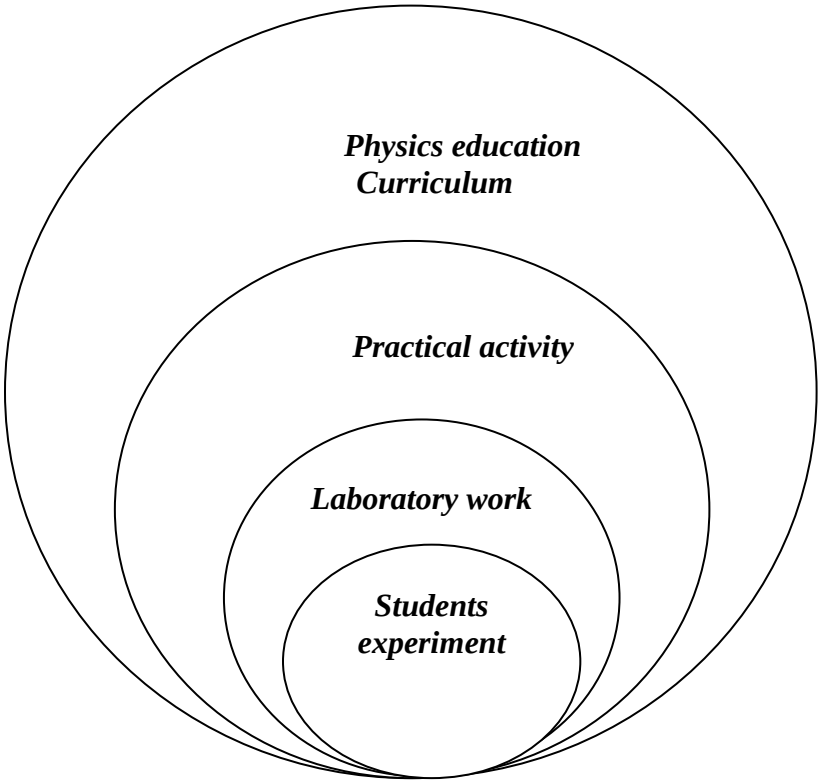

Figure 1: Interrelation ship between experiment, laboratory work, and practical activity in physics curriculum

Physics is, by nature, a hands-on (doing) and minds-on (thinking) inquiry based discipline. Laboratory work is therefore normally seen as essential in the study of physics. For more than a century, laboratory work activities have played a central and distinctive role in physics education (Hofstein & Lunetta, 2003). However, these authors remarked that for many students the lab work is mainly manipulating equipment (doing) but not manipulating ideas (thinking). In many countries, physics is included in the integrated science education curriculum component of compulsory schools. The school science laboratory is considered by education researchers as a unique resource that can enhance students' interest in science and develop new understanding of science concepts and procedures. Experiences in a school laboratory can also help students to gain ideas about the nature of science that are crucial for their understanding of scientific knowledge (Lunetta, Hofstein & Clough, 2007). Even though laboratory activities are recognized as being essential for the teaching and learning of physics, in reality many school physics teachers have limited knowledge of how to design and run effective laboratory teaching (Sweeney & Paradis, 2004).

g) Former school background and academic performance

The school one attends is the institutional environment that sets the parameters of a students' learning experience. According to Considine and Zappala (2002) the type of school a child attends influences educational outcomes. Kwesiga (2002) agrees that school has an effect on the academic performance of students but argued that school facilities determine the quality of the school, which in turn influences the achievements, and attainment of its pupils. All scholars be in agreement in attitude that schools do influence academic performance of students.

h) Social economic status and academic performance

Social economic status is most commonly determined by combining parents' educational level, occupational status and income level (McMillan & Western, 2000). In most of the studies done on academic performance of students, it is not amazing that social economic standing is one of the main factors studied while predicting academic performance. It is understood that low social economic status negatively affects academic achievement because low social economic position prevents access to fundamental assets and creates additional pressure at home. Graetz (1995) carried out a study on social economic status in education research and policy found that social economic background remains one of the major sources of educational inequality and adds that one's educational success depends very strongly on the social economic status of one's parents.

According to the literature cited it can be seen that social economic status is correlated to academic performance, whether one studies social economic status as a whole or with distinct dimensions, there is considerable support to hypothesize that parents' social economic status affects academic performance of students. (Jeynes 2002; Greatz 1995; Zappala 2002; Hansen & Mastekaasa 2003) Students who come from low social economic backgrounds earn lower examination scores compared to their counter parts from high social economic backgrounds (Eamon 2005).

The achievement of students is negatively correlated with the low socio economic status level of parents because it hinders the individual in gaining access to sources and resources

of learning (Duke, 2000; Eamon, 2005). Low SES level strongly affects the achievement of students, dragging them down to a lower level (Sander, 2001). It is also observed that the economically disadvantaged parents are less able to afford the cost of education of their children at higher levels and consequently they do not work at their fullest potential (Rouse & Barrow, 2006).

i) Assessment and achievement

Assessment includes informal classroom processes such as observing pupils tackling a task, questioning them about their work, looking at the records of their previous work or listening in on their discussions. More formal processes include testing and setting assignment for marking and the national system of tests and examinations. Assessment provides insight into very specific aspects of the thinking and performance of pupils (Brenner, 2004).

Chapter 3 : Research Design and Methodology

This section presents the study design and methodology. The design, setting, population, samples and sampling techniques, data collecting instruments, data collection procedures, data analysis and interpretation actions of the study are described in brief.

3.1 Research Design

The main objective of this study was to investigate the main challenging problems that hinder students' academic performance in physics subject in governmental preparatory schools in selected areas of Arsi Zone.

In order to achieve this objective, a descriptive survey research design was employed. The design of study was adopted a descriptive survey design. Descriptive research was concerned with conditions or relationships that exist, practices that prevail, processes that are going on, attitudes that are held or trends that are developing. The design facilitated the collection of information on the current performance in physics. It yielded information which was analyzed using descriptive and inferential statistics. It is also designed to show the relationship between the factors and performance and attempts to advance an explanation for poor performance in physics based on the data collected. *Figure 2* Shows design and Process of the research.

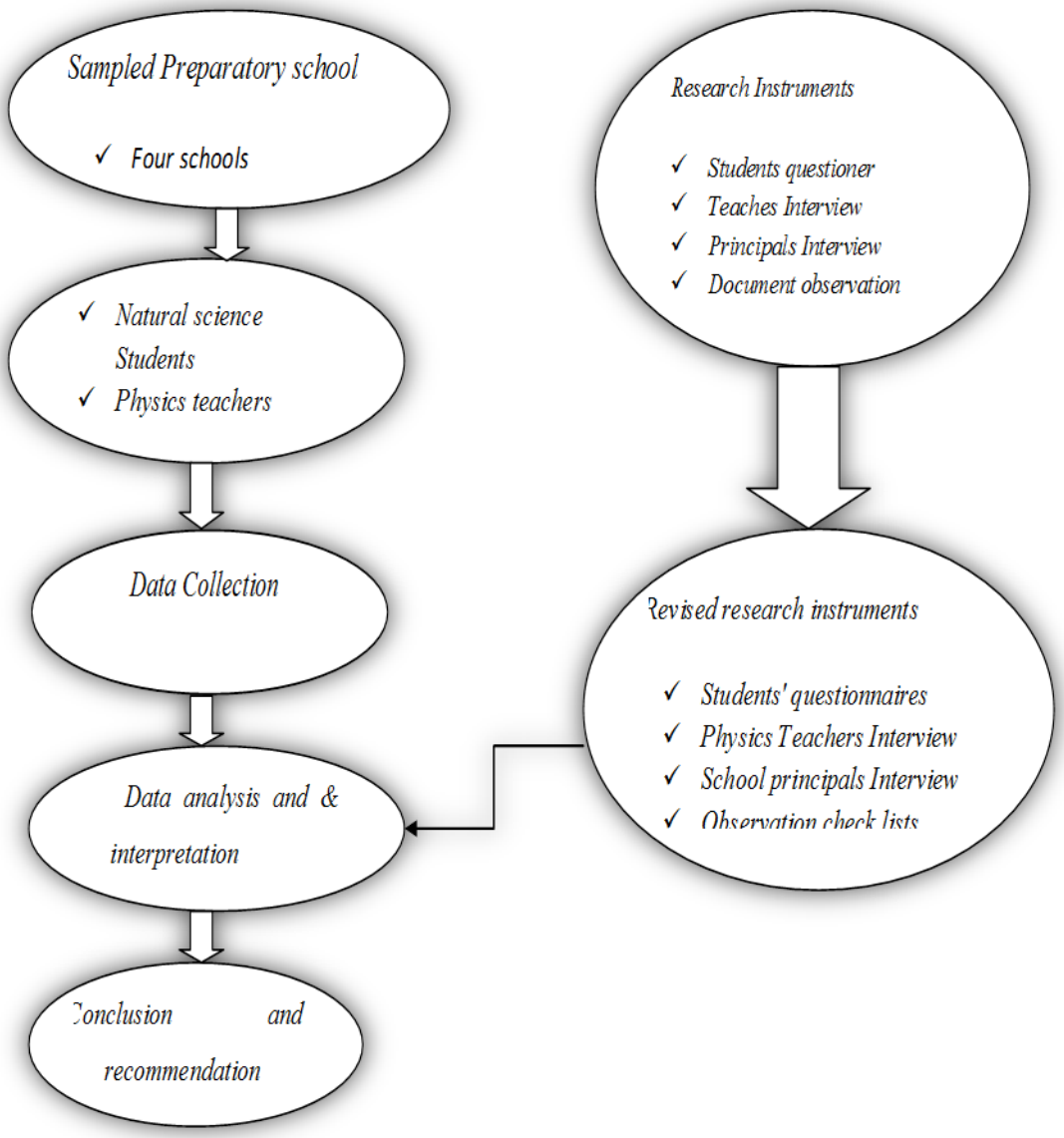

Figure 2: Represents the research procedure from the phase of building of the research instruments to the final phase of report writing and presentation

The process includes the process of preparation of the research instruments, the sampling process to identify the respondents for the study from the target population, the process of data collection, data analysis and finally report writing.

3.1.1 Variables

The variables in this study included students' performance which is the dependent variable while the independent variables included students attitude, teacher characteristics, teaching strategies, availability and use of resources and facilities, students' characteristics, learning conditions in the school and assessment.

3.2 Methodology

3.2.1 Location of the study

The study was conducted in the Oromia region:- Bekoji Town, Tiyo, Sagure, and Hetosa woreda which is located the south Eastern part of Oromia and 229km,175km,185km, 150km far from Addis Ababa respectively. This woredas are chosen as the setting because it is available in transportation and other facilities for the researcher work place. In each wored there is only one Governmental preparatory school, and the study was done in each preparatory schools.

3.2.2 Target population

The target population in this research was grade 11 and grade 12 preparatory school students in Arsi Zone the case of Bekoji, Tiyo, Hetosa and Sagure woreda. The total numbers of students in the selected schools were one thousand twenty (1020), the total numbers of physics teachers in these schools were seven (07) and there are five school directors. This formed the study population. Attitudes in physics, experiences in physics class, experiences out of school about physics and the environment of the school in physics education were assessed to describe some problem in the academic performance of Preparatory students in physics. Preparatory school students, physics teachers, Department heads school directors were sources of the study.

3.2.3 Sampling techniques and sample size

There are a total of about 25 preparatory schools in Arsi Zone. In order to gain insight in to the problems challenging the academic performance of physics in these schools four

schools were selected for the research work and the selection was made by employing stratified sampling methods. There are about 1020 students in these four schools among them 110 students were taken as sample of the study. Cluster sampling method was used and ratios were calculated for the strata. Stratified sampling was involved to divide the population into homogeneous groups. Kothari (2004) defined these type of sampling processes as;-

> *... Under stratified sampling the population is divided into several sub-populations that are individually more homogeneous than the total population (the different sub-populations are called 'strata') and then we select items from each stratum to constitute a sample. Since each stratum is more homogeneous than the total population, we are able to get more precise estimates for each stratum and by estimating more accurately each of the component parts; we get a better estimate of the whole. In brief, stratified sampling results are more reliable and detailed information.*

Then the population were divided into sub-populations that are individually more homogeneous depending on their grade 10 EGSECE result than the total population as shown in Table **2** by cluster sampling the researcher was randomly select a specified number of students. All Educational administrator (school principals) and, five physics teachers (including department heads), and educational supervisors at Woreda and zonal level were hold understudy. Table 1 is an illustration of sampling process and Table **2** is an illustration of how the stratum was made and the sample taken.

Table 1: Sampling grid

No	School	Total no of		Sampled Population			
		Natural Science students	Physics Teachers	School principals	Students	Physics Teachers	Principals
1	Bekoji	542	2	2	50	1	1
2	Sagure	188	2	1	23	2	1
3	Iteya	230	2	1	25	1	1
4	Katar	60	1	1	12	1	1
Total		1020	7	5	110	5	4

Table 2: Sampled students grade 10 EGSECE result

Schools	Sampled students grade 10 EGSECE result					Sampled Students					
	A	B	C	D	-	A	B	C	D	-	Total
Bekoji	47	251	213	19	12	5	21	23	1	-	50
Sagure	18	80	70	17	3	3	9	11	-	-	23
Iteya	32	84	89	24	1	4	8	12	1	-	25
Ketar	6	19	25	9	1	1	5	6	-	-	12
Total	103	434	397	69	17	13	43	52	2	-	110

3.3 Research instruments

The main instruments of data collection for the survey were questionnaires, Interviews, observations and document analysis. These instruments were used in the study to obtain reliable information about the problem from the respondents. The questionnaires were framed in such a way that an enthusiastic respondent would need twenty to twenty five minutes to complete. The questionnaire consists of 43 items constructed on a five care. “Strongly Agree, Agree, Not sure, Disagree, and strongly disagree". It was divided into section I, II and III. Section I dealt with back ground information: the name of the school, age, sex and the present class. Section II and III contain the main body of the questionnaire which was designed to cover areas which contribute to identify the problems of learning physics in preparatory schools. Additional data were obtained by observation and oral interviews with the school principals and physics teachers, depending on where one was directed to. The questionnaires, observation checklist and interview questions are reproduced in the appendices.

a) Questionnaires

Lists of structured questionnaire were administered to the selected students to answer the questions and return the questionnaire. The questionnaires consists forty three questions printed in a definite order on a form. They were addressed the specific objectives of the

study. The questionnaires were found appropriate in enabling the researcher to gather a large amount of data. The questionnaires were developed based on the research objectives.

b) Observation

The observation data collection method is the most commonly used method. The main advantage of this method is that subjective bias is eliminated, the information obtained under this method relates to what is currently happening; it is not complicated by either the past behavior or future intentions or attitudes, and this method is independent of respondents' willingness to respond and as such is relatively less demanding of active cooperation on the part of respondents as happens to be the case in the interview or the questionnaire method Kothari (2004). A check list was used in recording observations. The guides were developed using SPSS guideline to schools. It was used to assess the effectiveness of instructional methods, variation of teaching methods, availability and adequacy of instructional resources. The sample of this schedule is attached as an appendix.

c) Interview

The interview method of collecting data was involved in presentation of oral-verbal stimuli and reply in terms of oral-verbal responses. A list of pre-recorded questions that the interviewer asks the interviewee and the answers were recorded on the schedule. There were two types of interview schedule intended for use in this research; physics teachers and principals. Each was developed based on the research objectives stated.

d) Document /file / Analysis

The Document Analysis is a good source of information for educational research. It is easily accessible and enables the researchers to study past events and issues if it is documented appropriately. Tharenou, Donohue and Cooper (2007), recommend as "It can [---] be used for triangulation of data, helping to counteract the biases of other methods and supplement sources of information".

Thus, students grade 10 EGSECE result were screened from the sampled schools. For this reason, the researcher prepared checklists and recorded it. Look at Appendix 3 for further information.

3.4 Validity of the instruments

According to Kothari (2004), content validity can be determined by using a panel of persons who shall judge how well the measuring instrument meets the standards. The instrument was validated by discussing the instruments with education experts and physics teachers at different level, who ascertain whether the questions were relevant, clear and unambiguous. And also if the items were sufficiently inclusive of major factors that lead to effective “Identifying problems challenging the academic performance of students in physics in preparatory school in Arsi Zone"

3.5 Data collection procedures

The researcher was visited participated schools in order to introduced, familiarize, and seek respondents' information which were involved in the study. Then researcher was administered the questionnaires to the selected natural science students. The researcher equally interviewed physics teachers and the school principals. Previous files and documents were also observed and recorded using the observation checklist.

3.6 Data Analysis

A total of 43 questionnaires were administered to the selected students who were learning in the selected preparatory schools. However, 43 questionnaires were returned. Hence, the response rate was 95% for students’ questionnaires. Then, the researcher screened the data gathered from the respondents before inserting them to the SPSS software. This was a very important phase of preparing data. The data gathered using quantitative and qualitative methods were analyzed both quantitatively and qualitatively respectively. The information gathered through closed-ended questionnaire was coded, tabulated and analyzed using descriptive statistics or numerical analysis such as mean and standard deviation by using SPSS. Data analysis was carried out to show how each variable

contributed to performance in Physics. On the other way the data collected through the interview, observation and documents analysis was analyzed using qualitative method of data analysis.

Chapter 4 : Presentation, Analysis and Interpretation of the Data

Introduction

This chapter presents the data, analysis and interpretation of the data collected through the questionnaire, document analysis and observation checklist from a sample of 110 students from four different governmental preparatory schools, five preparatory physics teachers and four principals of the sampled schools.

The basic statistics that are presented in the tables below include the number of participants (N), agreement Scales, mean (M) and standard deviation (SD). Items which have similar mean and standard deviations were analyzed together.

4.1 Data analysis

Data analysis and report findings were done using descriptive statistics in the form of tables, frequencies, mean and Standard deviation.

4.1.1 Quantitative data

Quantitative data analysis was based on descriptive statistics. Data analysis began by coding the data according to the research questions. The data was then entered into the computer using the Statistical Package for Social Sciences program (Hear after, SPSS) for analysis. Frequency means, and standard deviations were used to present the information and analyzed to determine the relationship between the independent and dependent variables.

4.1.2 Qualitative data

For qualitative data, the researcher coded and assigned labels to variable categories. General themes were then obtained from the data composed and clustered in a patterned arrangement so as to identify variables that depicted general concepts and differences.

Inferences were drained from the data under each argument and conclusions were, then, made from the findings.

4.2 Characteristics of the Respondents

4.2.1 Distribution **of respondent students in their schools**

Respondents were drawn from four different schools: A summary of their background information is represented in **Table** 3.

Table 3: Description of respondents in terms of institutions

Academic Year	Schools												Total		
	Bekoji			Sagure			Iteya			Ketar					
	M	F	T	M	F	T	M	F	T	M	F	T	M	F	T
2009	22	3	25	5	4	9	8	3	11	5	-	5	40	10	50
2010	17	8	25	9	5	14	10	4	14	4	3	7	40	20	60
Total	**39**	**11**	**50**	**14**	**9**	**23**	**18**	**7**	**25**	**9**	**3**	**12**	**80**	**30**	**110**

Table 3 provides information on sampled students' distribution based on their school of the total sampled respondents, 50 (45.45%) were taken from Bekoji, 23 (20.9%) from Sagure, 25 (22.7%) from Iteya and 12 (10.9%) from Ketar preparatory schools.

4.2.2 Demographic Characteristics of the Respondents

The respondents were inquired to specify their personal information before providing their response to the items prepared for the study. The details are discussed in ***Table** 4*

Table 4: Demographic characteristics of the respondents

№	*Statement*		Students		Physics Teachers		School Principals	
			№	%	№	%	№	%
1	Sex	Male	80	72.73	5	100	4	100
		Female	30	27.27	-	0	-	0
		Total	**110**	**100**	**5**	**100**	**4**	**100**
2	Academic Status	MA	-	-	2	40	3	75
	MA	Degree	-	-	3	60	1	25
	Degree	Grade 11	60	54.55	-	-	-	-
		Grade 12	50	45.45	-	-	-	-
	Total		110	100	5	100	4	100

*Table **4*** shows, from teacher respondents, 5 (100%) were males, whereas, there were no female physics teachers in these sampled schools. From school leaders 100% of them were male there were no female school leaders. Special attention should be given to encourage females in the field. On the other hand, 80 (72.73%) and 30 (27.27%) respondents were male and female students respectively.

4.2.3 Academic Status of Teachers

Table 4 indicates that 2 (40%) of teacher respondents were MA holders, whereas, the other 3 (60%) were degree holders and three of them were attending their second degree in summer program at different universities.

4.2.4 Sampled Student's background result

The sampled students were classified based on their grade 10 *EGSECE result* before they meet preparatory school. A summary of this finding is represented in *Table 5*.

Table 5: Sampled Student's grade 10 EGSECE result in the year 2009 and 2010 E.C

Academic year	School	Total No of sampled students	Score Recorded					Total
			A	B	C	D	-	
2009/2010	Bekoji	50	6	18	25	1	-	50
	Sagure	23	3	8	12	-	-	23
	Iteya	25	3	9	12	1	-	25
	Katar	12	1	5	6	-	-	12
Total		110	13	40	55	2	-	110
		100%	11.81%	36.36%	50.00%	1.82%		100%

Data obtained represented in Table 5 indicated that 13 (11.82%) respondents had scored an A, 40 (36.36%) of them were scored B, 55 (50.00%) of them were scored C, while the remaining 2 (1.82%) of them were scored D in secondary school *EGSECE* grade10 physics. It was noted that above 50% of the respondents were scored C and below C in physics when they were at grade 10 and they joined natural science preparatory school.

4.3 Students attitude towards physics

Six items were used in the questionnaire to assess students' attitude towards physics. To achieve this objective, the study sought to inquire whether students believes that the subject related to their life or not, whether they enjoyed physics lessons or not, whether they like or dislike the physics lessons.

Table 6 shows the attitude of students toward physics subject before and after the joining of preparatory school.

Table 6: Students response in terms of their attitude toward physics

№	***Statement***		***Agreements Scales***						
		N	5	4	3	2	1	M	SD
1	Physics is related to my life	110	4	25	47	30	4	2.95	.89
2	I like Physics lessons	110	4	40	8	44	14	3.22	1.18
3	Physics is an easy subject other than the other subjects	110	4	10	36	43	17	2.46	1.18
4	I enjoy other Science subjects (Biology & chemistry) more than Physics	110	14	36	37	16	7	3.31	1.2
5	I like physics so much, I want to be physicist	110	11	17	34	37	11	2.82	1.13
6	I am interested in physics but little scared of the difficulty	109	7	34	20	40	8	3.07	1.11
	Grand mean and SD							2.97	1.11

Note: N= Number of respondents who filled the items correctly.

1= strongly disagree, 2= Disagree, 3= Not sure, 4=Agree and 5= Strongly Agree M= Mean SD= Standard deviation

***Table** 6* gives a review of the analysis of students' attitudes towards Physics. Item 1 indicates with 2.95 mean and .89 SD values that students didn't believe that Physics is related to their future life. Conversely, some of them agreed that physics is related to their life while some of them did not agree with this idea.

Item 2 indicate that the respondents' likes physics lessons with 3.22 mean values. Item 3 in this section indicate whether Physics is an easy subject other than the other subjects. The respondents responded with 2.46 mean values that Physics is not the easiest subject other than the other subjects given in the class. The item shows that students in the preparatory schools, Physics is perceived as a difficult subject other than the other science subjects. The SD scores also exhibit as there was no significant difference between the respondents. However, almost the entire test papers exhibit that there were some students who like Physics lessons, and some of them did not believe that Physics is a difficult subject other than the other subjects.

Item 4 noticeable that on comparing physics to other Science subjects (Biology and Chemistry), students agree with 3.31 mean that they enjoyed doing the other Science subjects than physics. The SD scores exhibit as there was no significant difference between the respondents. The cause of the negative perception of students towards Physics was identified by *Jegede & Adedayo (2013*) to include the fear of the mathematical skills involved, harsh teacher-students' relationship, students' un readiness to study, preconceived bad information that Physics is a difficult subject and poor method of teaching. This impression greatly affects students' readiness and interest to the study of Physics.

Item 5, manifests that students didn't like physics and they didn't want to be physicist in the future with 2.82 mean and 1.15 SD values. On the other hand, some of them liked physics and they wanted to be physicist in the future, while some of them did not decided whether they would be physicist or not. Item 6 noticeable that the respondents were interested in physics but they were a little scared of the difficulty with 3.07 mean and 1.1 SD scores.

Generally, the overall mean score (2.97) shows that students almost had negative attitude towards physics. The overall SD value (1.11) depicts that there was no significant difference between the respondents because the SD values signify as there is no extreme score in the table.

However, the data from the semi-structured interview indicated that the attitude of most of students towards physics was negative.

One of physics teacher from Keter preparatory school replied that:

'' Students believe that physics is difficult subject other than the other science subject. Most of the students state that even if we use most of our time to study we can't score good result when we take grade 12 entrance exam"

Hence, it is possible to deduce that Students attitude toward physics before and after they joined natural science at preparatory school was low.

4.3.1 Effects of students' attitude on their performance in physics

To investigate the effects of students' attitude on performance in physics, a one way Analysis of Variance (ANOVA) test was prepared based on the respondents reaction whether their result improved or not. The result is presented in Table 7

Descriptive

My physics result improved significantly

Table 7*: Students agreements for item My physics result improved significantly*

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
Strongly Disagree	4	2.75	1.258	.629	.75	4.75	1	4
Disagree	29	2.74	1.023	.197	2.34	3.15	1	5
Not sure	51	3.09	.962	.142	2.80	3.37	1	5
Agree	20	2.81	1.312	.252	2.96	4.00	1	5
Strongly Agree	4	2.70	.816	.408	1.70	4.30	2	4
Total	108	2.82	1.095	.105	2.87	3.29	1	5

Table 7 shows the respondents strongly disagreed with mean 2.75. Those who respond disagree have mean of 2.74, and those who were not sure whether their result improved or not have a mean of 3.09, those agreed with a mean 2.81 and strongly agree followed with 2.7 mean.

Generally, the overall mean score (2.82) shows that students physics result was not improved significantly and their attitude toward the subject affected their current performance. The overall SD value (1.09) depicts that there was no significant difference between the respondents because the SD values signify as there is no extreme score in the table.

4.4 Students characteristics

Six items were used in the questionnaire to assess students' characteristics towards physics. To achieve this objective, the study sought to inquire whether students liked to study physics or not, whether there English language skill affected their performance of physics or not, the way that they join natural science department, whether their friends and families influenced them to study physics or not, and the use of computers in studying the subject. The summary of the analysis is represented in Table 8.

Table 8: Illustrations of students' characteristics

№	*Statement*	N	*Agreements Scales* 5	4	3	2	1	M	SD
1	I like studying Physics most of my free time	110	7	32	16	39	16	2.77	1.2
2	My English language skill promotes my performance in physics	110	10	38	15	27	20	2.92	1.30
3	I join natural science department by my choice	110	15	34	10	20	21	2.93	1.38
4	My friends encourage me to study Physics.	110	8	20	23	46	13	2.67	1.12
5	My family encourage me to study Physics	109	4	17	18	49	21	2.39	1.08
6	I use computers to support my physics study	109	8	12	11	49	29	2.28	1.18
	Grand mean and SD							2.66	1.21

Note: N= Number of respondents who filled the items correctly.

1= strongly disagree, 2= Disagree, 3= Not sure, 4=Agree and 5= Strongly Agree M= Mean SD= Standard deviation

In terms of time invested in the study of the subject, an important aspect of characteristics of students in *Table **8*** designates with 2.77 mean and 1.2 SD value that most of the students studying behavior of physics subject was too weak, whereas there were students who spend their free time to study physics, but from the above table, those students were small in number (39 students out of 110).

Item 2 indicates that students' English language skill had no much effect on students' to understanding of Physics while they studied and in teaching and learning process ahead with a mean value 2.92. In additions, some of the students responded that their English language skill affected their performance in physics whereas others were un able to decide whether their English language skill affect their performance or not. A total of mean 2.92 therefore attested that their English language did not affect their performance in physics.

According to Ethiopian Education policy, after students take grade 10 EGSECE, they have the alternative of joining either natural or social field when they score a pass mark to continue their education at preparatory school. i.e. they can choose natural science or social science field. In addition, it is expected that 70% of them should join the natural science and the rest 30% the social science field.

Even if there were students who were join natural science with their first alternative, Item 3 manifest with a mean of 2.93 that students join natural science field without their choice. This indicates that they were forced by the schools or others to choose the natural science field to fulfill the ratio 70 to 30.

Item 4 and 5 in Table 8 in this section endeavored whether the respondents were influenced by either peers or families to study physics or not. With almost similar mean and SD scores, the influence of friends and their family to study physics was not much. The SD scores reveal as the respondents had given almost similar response. It was only some of the respondents who agreed that peers and their families influenced them to study. Item 6 designates that students didn't use any computers / internet access / to study physics in the class and out of the class with 2.28 mean and 1.1 SD values.

To sum up, the grand mean for the extent to which students characteristics affect students performance in physics is 2.66, whereas, the SD score is 1.25. It is possible to deduce that the value of each mean were not far from the grand mean. Besides, the average SD indicates as there is no significant difference among the respondents when compared with each item's SD. Hence, the data in ***Table 8*** depicts that the Students characteristics affects their performance in physics.

4.5 Students response to the teaching strategies of their teachers

Table 9 shows the relation between teachers and students during teaching learning process and their relation out of the class. Consequently, respondents were requested to show their agreement on the level of class participation, their teachers' friendliness, the way they take physics tests in the class and the amount of group tasks given by the subject teacher among other issues. The summary of this analysis is represented as follow.

Table 9: Response of students in terms of teaching strategies of their teachers

№			*Agreements Scales*						
	Statement	No	5	4	3	2	1	M	SD
1	I am happy with my physics teacher teaching method	110	36	43	13	11	7	3.82	1.18
2	I ask questions on what is not clear to me	110	22	54	16	17	1	3.72	.99
3	Group tasks are given by our Physics teacher	110	15	66	13	13	3	3.74	1.09
4	Assignments and practical works usually given by our Physics teacher and marks them	110	27	50	14	15	4	3.83	1.06
5	Our Physics teacher allows us to participate in the learning of Physics	110	33	43	15	17	1	3.35	1.24
6	We take Physics tests periodically	110	21	40	14	27	8	4.03	.91
	Grand mean and SD							3.75	1.08

Note: N= Number of respondents who filled the items correctly.

1= strongly disagree, 2= Disagree, 3= Not sure, 4=Agree and 5= Strongly Agree M= Mean SD= Standard deviation

The students' response in item 1 and 2 points out that students were happy with their physics teacher teaching method. During teaching learning process the students responded that they were participating in the class and they asked questions on what was not clear to them with almost similar mean and SD. The SD values indicate as there is no considerable disparity between the respondents.

Item 3 and 4 in Table 9 reveal that when teaching learning process ahead group tasks were given by the subject teachers for students to practice together, and assignments were also given by their Physics teachers in group and individually and the teachers marked them. The respondents showed their agreement with almost similar mean (3.74 & 3.83) and SD values. The SD scores point out that the respondents were identical in their response.

Item 5 manifest that their Physics teacher allows them to participate in the learning of Physics with a mean of 3.35 and 1.24 SD. The SD scores exhibit as there was no significant difference between the respondents. The last item in this section, item 6 shows that the students' agreed as their teachers gave them Physics tests periodically with 4.03 mean and .96 SD values. The SD value dedicate that the respondents were identical in their response.

On the whole, the value of each mean score for the students' response to the teaching strategies of their physics teachers is not far from the grand mean 3.75. Whereas the SD score is 1.08. Hence, physics teachers were close to their students and their method of teaching was almost favorable to their learners and from the students response it is possible to deduce that learners work in group, assignments and testes were given to the learners periodically.

4.6 Students response on resource availability and use

A summary of the analysis of students account on availability and use of resources for teaching and learning of physics is presented in Table 10. A total of 11 items were used to achieve this objective. Students were requested to determine whether they had sufficient text books, whether there were separate laboratories in the institutions, the state of the laboratories in terms of apparatus, frequency of their use laboratories for practical

activities, whether the school had sufficient computers and whether there were an internet accesses in the schools and whether the schools had a laboratory technician.

Table 10: Response of students in terms of resource availability and use

№	Statement		Agreements Scales						
		No	5	4	3	2	1	M	SD
1	We have sufficient Physics text books	110	33	60	5	11	1	4.03	.91
2	There is adequate physics reference books in our library.	109	22	56	11	14	6	3.68	1.10
3	Our Physics teacher always use teaching aids like charts, models etc. during Physics lesson	109	10	21	15	34	29	2.53	1.32
4	I perform Physics practically	109	4	7	14	37	47	1.94	1.07
5	Our school has separate Physics laboratory	109	6	11	16	27	49	2.06	1.22
6	Our school has physics laboratory technician	110	1	3	4	34	68	1.5	.78
7	I perform experiment in laboratory	110	2	2	6	31	69	1.52	.83
8	There are adequate apparatus in our laboratory room	110	4	4	7	38	57	1.73	1.00
9	There are computers in our school	110	15	77	3	7	8	3.76	1.01
10	There is internet access in our school	110	4	3	14	39	50	1.84	1.00
11	In addition to our regular time our teacher gives us tutorial classes	110	17	45	6	21	21	3.15	1.40
	Grand mean and SD							2.52	1.06

Note: N = Number of respondents who filled the items correctly.

1= Strongly disagree, 2= Disagree, 3= Not sure, 4=Agree and 5= Strongly Agree M= Mean SD= Standard deviation

Table 11: Observation checklist

	Availability		Used	
Resources/Facility	Availability in %	Unavailability in %	Used in%	Not used in%
Laboratory room	25%	75%	0%	100%
Library / reading room/	100%	-	100%	-
Pedagogy center	0%	-	-	-
ICT room	100%	-	100%	-
Locally available materials	0%	-	-	-
Text books	100%	-	100%	-
Reference books	100%	-	100%	
Projection equipments	75%	25%	75%	-
Physics Apparatus	-	100%	-	100%
Charts	0%	100%	-	100%
Models	0%	100%	-	100%

Table 11 shows an analysis of resource and facilities availability and use in schools.

In Table 10 item 1 and 2 presents with almost similar mean and SD that in all sampled schools almost students had sufficient physics text books individually, as well as there were adequate physics reference books in their schools. Having sufficient text books and reference books had great role on improving students' performance.

Besides, from data gathered by the semi-structured interview one of the school principals replied the following.

"*Our students have sufficient text books, each student have text books individually and by budgeting sufficient money to buy reference books, our school purchase sufficient reference books in each year. So now we have excess reference books in our library. In addition to these different nongovernmental institutions also provide us different reference books*"

The data from the test papers confirms the data gathered from the questionnaires. During observation, the researcher also observed that all students had text books individually and confirmed that there were reference books in their library.

Item 3, 4, 5, 6, 7 and 8 in the Table 10 conveys with similar mean and SD that during Physics lesson Physics teacher didn't use teaching aids like charts, models etc. they used only theoretical / lecture method/, the learners responded that they didn't perform Physics chemicals and apparatus which were used to carry out lessons practically, there were no separate Physics laboratory as well as there were no any laboratories in their school, there were no physics laboratory technician either and students didn't perform any experiment in their schools. The SD values indicate as there is no considerable disparity between the respondents.

One of the physics teachers in Bekoji School, for the use and availability of laboratory in their school replied that:

> "In *our school there is one laboratory room but it is not functional. It is used for other purpose. At this time it is used as book store all over the year. So, my students don't perform any activity in the laboratory, I don't use any type of charts and models to teach my students I teach my students only in theory"*

Similarly, the data collected from the observations denote as there were no separate laboratory rooms and there was no laboratory technician in the school. Therefore, students didn't perform any practical activities in their schools. Since there was no use of resources and availability of laboratories in the schools, the study sought to investigate the presence of other facilities and laboratories for emerging technologies.

Item 9 and 10 in Table 10 display that there were computers in these schools, these computers ware available only to teach Information communication technology subject. The students responded that there was no any internet access in the schools with slightly similar mean and SD values. The SD scores confirm that there was no significant difference between the respondents.

Table 11 provides a summing up of an analysis of observed teaching/learning resources and facilities. Data obtained showed that 75% of the sampled schools had no a working laboratory room, only one school had laboratory room. All selected schools had no functional separate physics laboratory room shared with other science subjects. In terms of

textbooks and other reference resources, all the sampled schools had student to textbook ratio of 1:1 per class for physics. It was, however, well-known that some of those facilities mainly audio visual teaching aids such as charts and models were not satisfactorily used. Besides, it was observed that the teachers favored more teachers centered teaching approaches. This can have negative impact on the performance of students.

Item 11 on Table 10 shows with 3.15 mean and 1.4 SD scores that in addition to regular classes subject teachers gave tutorial /supportive/ classes for their students. The SD indicates as there is a slight difference among the respondents when compared with other item's SD.

One of the interviewees from school principal replied that;

> "To *improve our students performance in physics, one of the methods that we use is in addition to our regular time, teachers give tutorial classes for their students voluntarily. But the tutorials are not as expected. These is because there is no additional payments / incentives/ for the teachers*"

It is possible to deduce that in addition to regular classes subject teachers gave tutorial classes for their students at their free time without any payment.

4.7 Students perception of their physics teacher

The following items were planned to provide the learners perception of their teacher's outlook towards their aptitude in physics as a determinant of the teachers attitude towards their performance in the subject. Respondents were mandatory to respond for teacher's friendliness, supportiveness, teachers role to attract them to physics, how much that their teachers confident with them to be successful in physics to the future and the like.

Table 12: students' perception of their physics teacher

№	*Statement*	N	*Agreements Scales* 5	4	3	2	1	M	SD
1	I like my Physics teacher	109	41	48	7	10	3	4.05	1.03
2	Our Physics teacher is friendly, supportive and influenced me to choose Physics	109	30	37	18	17	7	3.61	1.22
3	Our physics teacher told us the role of physics in science & technology	108	33	46	14	9	6	3.84	1.12
4	I am satisfied with my physics teachers performance	106	18	55	18	11	4	3.68	1
5	My physics teacher can improves my performance in physics	107	24	44	21	12	6	3.64	1.12
6	My Physics teacher believes that I can perform well in Physics	107	17	31	46	10	3	3.46	.96
	Grand mean and SD							3.71	1.09

Note: N= Number of respondents who filled the items correctly.

1= strongly disagree, 2= Disagree, 3= Not sure, 4=Agree and 5= Strongly Agree M= Mean SD= Standard deviation

Item 1, 2, 3 and 5 in Table 11 express that most of the students liked their physics teachers, the relation that they had between their teachers was friendly and supportive, their teachers told them the role of physics in the science and technologies and the students believed that their teachers could improve their performance in physics respectively with related mean and SD scores. The SD scores illustrate the respondents were homogenous in their response. During observation the researcher confirmed there was good relationship between students, teachers and the school principals. Most of the time teachers are in contact with the students. Through such contacts, they communicate their outlook and expectations to students and the students were expected to closely believe the teachers. Teachers are the most significant agents that be capable of to pressure change in their learners attitude towards their performance in the subjects.

Item 4 and 6 describe that students were satisfied with their physics teachers performance and they believed that their Physics teachers would help them to perform well in Physics

with almost similar mean and Standard deviation values. The SD scores point out that the respondents were identical in their response.

Some of the responses, however, contradict each other. i.e. on this research finding, the students response toward their attitude on *Table 6* toward physics was not positive. But the learner likes their physics teachers and almost all the respondents were however in agreement that their teachers would improve their performance in physics.

4.8 Interview Result

The interviews were conducted 5 physics preparatory teachers and 4 school principals. The interviews were administered to counter-check the information given in the students questionnaires and to get a richer view on all the factors they considered as major contributors to students' poor performance in physics. The interviewer took notes and was recorded.

4.8.1 Interview of physics teachers

On the question of students' performance, almost all of the teachers said performance of students can be viewed in three categories. Few of them were high achievers, some of them medium and the rest poor one. Majority of their students that were above 50% was felt it was poor.

All the respondents explained that there existed a friendly relationship between them and their respective school administration and a good professional working relationship between themselves and their students. This, therefore, resulted in a conducive teaching and learning environment in which the students, teachers and the administrators interacted freely and consulted fairly well. They further added that their students were able to talk them freely.

In relation to Continuous Professional Development (CPD) all of the interviewed teachers indicated they had attended the program. However all of them did not believe that this course improves their profession and all of the respondents felt that the training was not relevant to the subject matter.

A number of challenges were listed as being faced in teaching physics in their schools. The challenges include:

i. Poor attitude of the students and the families towards natural science department.
ii. Poor admission behavior of students
iii. Insufficient teaching and learning resources
iv. Inadequate human resource / laboratory technician/
v. Lack of models and charts
vi. Lack of role models mainly in physics

75% of the teachers indicated that there were no laboratory class / room / in their school. 25% of them indicate that there was laboratory room but it was not functional. It was used for other purpose/ e.g. book store/. All of the respondents replied that they didn't use different models and charts during teaching and learning because the materials were not available in their schools. All of the respondents indicated that there was no computer integration in teaching and learning of all subjects including physics except Information communication technology /ICT/ subject.

The teachers suggested to have positive attitude towards Natural science, specifically physics, counseling of students and students family at least ones per year, it was good if students watched different industries to know applications of physics, teaching and learning resources models charts and facilities should be available, increasing manpower to lighten the existing teacher workload / physics laboratory technician/ if implemented would help to improve performance of students in physics.

4.8.2 Interview of School leaders

The school leaders were required to respond to a total of seven questions. On the question about students' achievements in physics, all of the respondents felt that performance in physics in their school was not as expected. It varied from students to students. They said in average it was not good. All of them, therefore, said this was an area where their schools had much concern and should try to improve. Data collected showed that students with varied entry behaviour were being admitted in the schools. The principals said that most of the admitted students with average scored in their grade 10 EGSECE result.

Since the schools admit students with varied academic abilities in terms of entry behavior, the outcome as measured in terms of both general performance as well as individual performance in summative test should also be varied.

Almost all the principals indicated that there existed peer and social influence among their students. The peer influence tended to have a significant negative influence on academic life. The students concerned were said to spend a lot of time on relationships at the expense of their studies. Depending on job opportunity after graduation by comparing social science with natural science social influence had also negative influence on academic performance. i.e. the society believe that social study students had better chance to be employed after graduation.

All the principals indicated, totally laboratory was not functional, there were no teaching models as well as there were no pedagogy centers. This was the main problems that caused difficulty to improve students' performance.

As concerns issues raised by the principals listed the following:

- Inadequate teaching and learning resources
- Students low entry behavior / low background in physics/
- Attitude of learners towards subject.
- Lack of role models
- Poor mastery of the mathematical skill

The principals said they had qualified, experienced and committed teachers who were doing their best to ensure that learning takes place as expected. This was confirmed with the question that delivered for students in terms of perception of their physics teachers.

When the principals were asked whether their physics teachers had attended CPD, all confirmed that they were attending the program, but it was not effective. The teachers attend the program only for their efficiency.

Most of the principals (100%) said provision of teaching and learning facilities was a major challenge in their schools. So the government should release funds for the program impacted negatively on provision of laboratory equipments and chemicals. The principals also complained that the amount budget allocated for the acquisition of laboratory apparatus and chemicals was not enough to cater for both teaching

practical sessions and assessing students practical competence. Lack of adequate teaching and learning resources could be a contributor to poor performance in physics. On the issue of access to and use of information technology and its integration into the teaching and learning process, all the principals of sampled schools indicated willingness to embrace computer integration. The principals said their schools had acquired adequate computers which were being used to teach computer studies /ICT/, the computers were not used in teaching of other subjects including physics.

The principals therefore recommended that the following measures should be undertaken to improve students' performance in physics in their schools:

- Students should be counseled to change their attitude towards physics
- Enhance the practical approach to the teaching and learning of physics
- Improve the use of ICT in teaching and learning
- Provision of more facilities
- Remedial classes should be available for students.
- Improved provision of learning resources and equipment.
- There should be incentives for teachers who give remedial classes.
- Guiding students on the importance of hard work in order to improve performance.

Chapter 5 : Summary, Conclusion and Recommendation

This chapter consists of the summary of the findings, general conclusions and recommendations. They are assumed to establish the key determinants of performance in physics in Arsi Zone preparatory schools in an attempt to provide a way of remedying the persistent poor performance in the subject.

The study investigated students' attitude towards physics and its effects on performance, effects of students' background characteristics on performance, availability and use of teaching and learning resources and facilities and its effects on performance.

5.1 Summary

The purpose of this study was to identify problems challenging the academic performance of students in physics at the preparatory schools in Arsi Zone. To meet this purpose, the following basic research questions were developed.

a. What are the effects of background characteristics on students' performance in Physics?
b. What are the students' attitudes towards Physics?
c. How do students perceive their Physics teachers?
d. What are the effects of resources on students' achievement in physics?
e. What teaching techniques do teachers use to teach physics?

To answer the above mentioned research questions, Natural science students, Physics teachers and principals in Arsi Zone preparatory school were used as the population of the study.

The data were obtained through questionnaires, semi-structured interview, semi-structured observation and document analysis. Questionnaires were distributed to the selected grade 11 and 12 natural science students. As a result, all questionnaire papers were returned. A semi-structured interview was also conducted with five physics teachers

and four school principals. Observations were also carried out in all the sample schools as well.

The data gathered through closed-ended questionnaire were coded, tabulated and analyzed using descriptive statistics such as frequency, mean and standard deviation by using SPSS version 20 software. The additional data, on the other hand, gained from semi-structured interview, document analysis and observations were also coded, categorized and identified thematically in order to approve or disapprove the quantitative data.

Hence, depending on the data analysis, the following major findings were discovered pertaining to the research questions.

i. Background characteristics on student's performance in Physics

The population of the respondents was not even (males= 72.7%; females= 27.3%) which does not signifying a condition of gender parity. The respondents studied in normal populated classrooms. In average, their classroom was not more than 40 students per class which is recommended by MOE standard.

The students' backgrounds result when they were in grade 10 indicated that 11.82% of the respondents scored A, 36.36 % scored B, 50.00% scored C, and 1.82% scored D. The academic achievement of the students in EGSECE result was above 50% who scored C and below were admitted to natural science field. This was one of the factors found to affect students' performance in physics at grade 11 and 12 in some selected preparatory schools of Arsi Zone.

In general, the data showed that there was a significant relationship between poor backgrounds relative to physics. This was also one of the cause of the Arsi zone preparatory students persistent poor performance in physics subject. This finding agrees with other findings such as that of Usman and Memeh (2007) who stated that poor achievement in physics was explained by several factors including students' background problems. The experience gathered from the secondary level would influence the students' academic performance in the preparatory schools.

ii. Students' attitudes towards Physics

Attitude towards science denotes interest or feeling towards studying science. The data gathered from the students indicated that they had negative attitude towards physics with grand mean 2.97 value, even though they liked physics lessons. To the majority of the students in the preparatory schools in some sampled schools, Physics is perceived as a difficult subject other than the other science subjects. This therefore could be interpreted to mean that most of the natural science students have no positive attitude towards physics which affects their performance in physics negatively.

iii. How do students perceive their Physics teachers

Most of the time teachers are in contact with the students. Through such contacts, they communicate their outlook and expectations to students and the students were expected to closely believe the teachers. In this some selected schools, students generally considered their teachers' perceptions of their abilities to be positive and the learner likes their physics teachers and almost all the respondents were however in agreement that their teachers would improve their performance in physics. This means positive perception towards the subject teacher has a positive influence on performance in the subject.

iv. The effects of resources on students' achievement in physics

There were adequate reference books in the sampled school libraries. Additionally, all of the students had physics text books individually.

Among the sampled schools, three of them had no separate laboratory rooms and in all of them there were no laboratory technicians. Therefore, these schools lacked well equipped laboratories with chemicals and reagents. Besides, all of the schools did not have laboratory assistants. Students didn't perform any practical activities in their schools

thereby making physics teaching difficult and tedious for teachers. So, students were less involved in hands-on practical activities.

Even though using audio visual teaching aids such as models and charts more advantageous, they were not satisfactorily used in the selected schools. Besides, it was observed that the teachers favored more teachers centered teaching approaches. Without doubt no effective Physics teaching can exist without learning materials, equipment and practical activities. It is therefore expedient that Physics laboratories must be adequately stocked with the necessary resources facilities for effective teaching and learning of the subject.

v. *What teaching techniques do teachers use to teach physics*

Quality teaching of science requires regular inquiry-oriented hands-on practical and activity work for all students so that they can develop inquiry skills and an appreciation of the nature of science. Data gathered from the questionnaire revealed that physics lesson was devoted to teacher-centered activities such as explanation, discussion and giving notes.

Moreover, data gathered from the interview of Physics teachers and school leaders corroborate with data gathered from students' questionnaire. The interviewees indicated that students frequently listen to teachers' explanations and copy notes given by the teacher and follow teachers' instructions in actual physics lessons. In addition to regular classes, teachers gave tutorial classes for their students although they had no additional payments. As a result, the tutorial classes given by the teachers were not as expected.

5.2 Conclusion

Based on the findings of the study, the following conclusions were drawn:

To determine all the influencing factors in a single attempt is a complex and difficult task. From the foregoing summary, it can be concluded that the poor performance of students in physics in Arsi Zone preparatory schools can be attributed to students' background characteristics, attitude, teaching learning methods used, inadequate use of resources in the teaching and learning process and` social effects.

Lack of resources like well-organized laboratory equipment, different models and charts, lack of interest to subject matter, and lack of laboratory technician were the prior problem that had been seen.

5.3 Recommendations

Based on the findings of the study, the following recommendations were forwarded:

- MOE should enhance supervision of schools to help improve the students' preparatory school entry behaviour, particularly, their background in physics and other natural science field.
- MOE should increase the education finance to enable equipments and facilities of schools to acquire better teaching and learning..
- There should be more allocation of funds for education by MOE to build laboratory classrooms and there should also be sufficient funds to equip the laboratories with chemicals and reagents, for regular maintenance of laboratories and equipment, and to provide quality reference books for the library.
- Organize more motivational talks by physics professionals and Observation of physics-based industries as a way of motivating the students to help change negative attitude and to build positive attitude of students towards the subject.
- The school administration should work intimately with the teachers and parents in counseling the students and their families to help counter the existing negative social influence.
- Teachers' allowances should regularly be paid and they should be supported, valued and recognized by government and the community while they support students by giving additional supportive classes.
- Lastly, further research is needed to explore the problem on a large sample from more scattered geographical regions including other student factors, family factors, school factors and peer factors.

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Appendix 1: Questionnaire to be filled by natural science students

Questions for students

The following questions (statements) are intended to gather information on problems that can be contributing to performance of students in physics in your school. Suggest your opinion against each of the statements. Thanks for accepting to take part in this program.

Section I: ***Background characteristics***.

1. Your school_____

2. Age _____

3. Sex Male ☐ Female ☐

Section II.

In this section, the abbreviations SA- Strongly Agree, A- Agree, NS- Not sure, D- Disagree, and SD- Strongly Disagree appear. Please respond to the statements by ticking the one you consider most appropriate.

	a. In terms of your attitude toward physics					
No	Statement	SA	A	NS	D	SD
1	Physics is related to my life					
2	I like Physics lessons					
3	Physics is an easy subject other than the other subjects					
4	I enjoy other Science subjects (Biology & chemistry) more than Physics					
5	I like physics so much, I want to be physicist					
6	I am interested in physics but little scared of the difficulty					
b. In terms of your characteristics						
No	Statement	SA	A	NS	D	SD
7	I like studying Physics most of my free time					
8	My English language skill promotes my performance in physics					
9	I join natural science department by my choice					
10	My friends encourage me to study Physics.					

11	My family encourage me to study Physics					
12	I use computers to support my physics study					
13	I am satisfied with my past grade 10 EGSECE result in Physics					
14	I am satisfied with my first semester Physics result					
15	My physics result improved significantly					
c. In terms of teaching strategies						
No	Statement	SA	A	NS	D	SD
16	I am happy with my physics teacher teaching method					
17	I ask questions on what is not clear to me					
18	Group tasks are given by our Physics teacher					
19	Assignments and practical works usually given by our Physics teacher and marks them					
20	Our Physics teacher allows us to participate in the learning of Physics					
21	We take Physics tests periodically					
d. In terms of teaching learning resources						
No	Statement	SA	A	NS	D	SD
22	We have sufficient Physics text books					
23	There is an adequate physics reference book in our library.					
24	Our Physics teacher always use teaching aids like charts, models etc. during Physics lesson					
25	I perform Physics practically					
26	Our school has separate Physics laboratory					
27	Our school has physics laboratory technician					
28	I perform experiment in laboratory					
29	There are adequate apparatus in our laboratory room					
30	There are computers in our school					
31	There is internet access in our school					
32	In addition to our regular time our teacher gives us tutorial classes					
e. In terms of perception of your physics teacher						
No	Statement	SA	A	NS	D	SD

33	I like my Physics teacher					
34	Our Physics teacher is friendly, supportive and influenced me to choose Physics					
35	Our physics teacher told us the role of physics in science & technology					
36	I am satisfied with my physics teachers performance					
37	My physics teacher can improves my performance in physics					
38	My Physics teacher believes that I can perform well in Physics					

Section III

39. To improve your performance in Physics, what do you consider the following stake holders should do?

I. Your fellow students

_____

_____

_____

II. The Physics teacher

_____

_____

_____

III. The School administration

_____

_____

_____

IV. . Yourself

_____

_____

V. Minister of Education_____

_____

_____

THANK YOU

END

Appendix 2: Interview Questions for Preparatory physics teachers

This interview aims at obtaining information on factors that contribute to students' performance in Physics in your school. The information you provide will be highly confidential and will only be used for the purposes of this study. Your cooperation is highly appreciated.

1. What are the problems that affect the teaching of physics in your school? (In terms of class size, class facilities,
2. What mechanisms do you use to improve their learning? What the students' perception like in your mechanism?
3. What are the resources that encourage your students to improve their learning? Do you think they are sufficient?
4. What is the role of other stake holders in improving students' performance in physics?
5. How do you improve your teaching ability? / how about on job training/
6. What is the nature of students in your school? (i.e. based on entry behavior, educational back ground , peer influence etc.)
7. In your opinion, what do you think should be done to improve students' performance in physics in your school?
8. How do you encourage your students to develop interest and better attitudes in physics?
9. What should you done to improve Poor students' attitude toward physics?

Appendix 3: Sampled schools Students grade 10 EGSECE result

Schools	Student grade 10 EGSECE result					Total
	A	B	C	D	-	
Bekoji	47	251	213	19	12	542
Sagure	18	80	70	17	3	188
Iteya	32	84	89	24	1	230
Ketar	6	19	25	9	1	60
Total	103	434	397	69	17	1020

Appendix 4: Interview Questions for School principal

This interview aims at obtaining information on factors that contribute to students' performance in Physics in your school. The information you provide will be highly confidential and will only be used for the purposes of this study. Your cooperation is highly appreciated.

1. What is the nature of students in your school i.e. based on entry behavior, educational background, and peer influence etc.?
2. What is your comment about the conditions under which students learn in your school? [Probe: tutorials, students study skill , use of reference books ....]
3. What are the favorable conditions that contribute for teaching learning process of physics in your school?
4. What is the influence of teacher's training and qualification towards students' performance in physics?
5. What are some of the questions raised by Science teachers in your school and how does your administration handle them?
6. What is the supervision of science teaching learning like in your school?
7. How do you encourage your physics teachers to show better attitude to work?
8. In your opinion, what do you think should be done to improve students' performance in physics in your school? (by students. teachers, principals.....)

THANK YOU

Appendix 5: Observation checklist

Generally, learning environment, availability, adequacy and effective use of resources and facilities influence achievement in physics subjects. Against each item are the words: Availability (Available, Unavailable); Adequacy (Adequate, Inadequate); and Usage (Used, Not used) for section I and SA- Strongly Agree, A- Agree, UD-Undecided, D-Disagree and SD Strongly Disagree for section II. The researcher will tick the most appropriate column.

Section I

Availability			**Used**	
Resources/Facility	**Available**	**Unavailable**	**Used**	**Not used**
Laboratory room				
Library / reading room/				
Pedagogy center				
ICT room				
Locally available materials				
Text books				
Reference books				
Projection equipments				
Apparatus				
Charts				
Models				

Section II

Statements	***SA***	***A***	***NS***	***D***	***SD***
Instruction style appropriate for the topic					
Class size is up to 40 students in a class					
Practical reports marked by the teacher during or after the practical					

Students are involved in the teaching/ learning process.					
Students follow scientific method in recording experiments					
Teachers and students use resources during lessons					
Written instructions for experiments given to the students before the experiment					
Assignments and home works given to students					