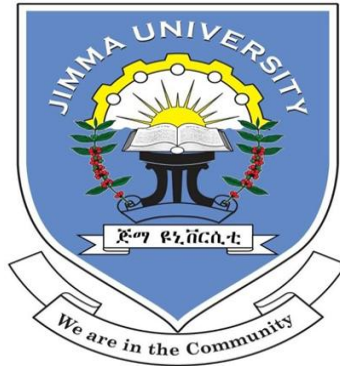


**ASSESSING THE CURRENT PRACTICES OF
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WOREDA AND JIMMA TOWN**

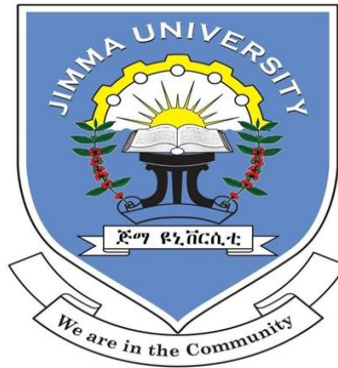


**A THESIS SUBMITTED TO THE DEPARTMENT OF PHYSICS, COLLEGE OF
NATURAL SCIENCES, JIMMA UNIVERSITY IN PARTIAL FULFILLMENT
OF THE REQUIREMENTS FOR MASTER'S OF SCIENCE DEGREE IN
PHYSICS**

BY: NASIR ABABOR

**NOVEMBER, 2016
JIMMA, ETHIOPIA**

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BY: NASIR ABABOR

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**NOVEMBER, 2016
JIMMA, UNIVERSITY**

DECLARATION

I, the undersigned, declare that this thesis entitled “Investigation of Physics Teaching Method in Preparatory Schools of Kersa Woreda and Jimma Town” is my original work, and has not been presented to any other university and that all sources of materials used for the thesis have been duly acknowledged.

Student Name	Signature	Date

This research paper has been submitted for examination with my approval as university advisors:

Advisors _____		
	Signature	Date
	Signature	Date

ACKNOWLEDGMENT

First of all, I would like to thank my advisors Mr. Chali Yadata from Jimma University, and Dr. Mekbib Alemu from Addis Ababa University for their valuable professional advice and guidance in conducting this study. My gratitude should also go to Jimma University for the financially and morally support in conducting this study. Moreover, I acknowledge Jimma Zone Education Office, Jimma Town and Kersa Woreda Education offices for facilitating the data collection process. Last but not least, I would also like to thank teachers, students and school principals of Kersa Woreda and Jimma Town preparatory schools for their full cooperation in providing information for the study.

TABLE CONTENTS

Contents	Page
DECLARATION	ii
ACKNOWLEDGEMENTS	iv
TABLE OF CONTENTS	v
LISTS OF TABLES	vii
ACRONYMS.....	viii
ABSTRACT.....	x
CHAPTER 1	
INTRODUCTION	1
1.1. Back Ground of the Study	1
1.2. Statement of the Problem	5
1.3. Research Question	6
1.4. Objectives of the Study	7
1.5. Significance of the Study	7
1.6. Delimitation of the Study.....	8
1.7. Limitation of the Study.....	8
CHAPTER 2	
REVIEW OF RELATED LITERATURE..	9
2.1. Definition of Teaching	9
2.2. Historical Development	10
2.3. Definition of Teaching Methods	11
2.4. Types of Teaching Methods	11
2.4.1. Traditional Teaching Method	11
2.4.2. Modern Teaching Methods	12
2.4.2.1. Inquiry Method	12
2.4.2.2. Discovery Method	13
2.4.2.3. Demonstration Method	14
2.4.2.4. Group Teaching Methods	14

2.5.	Theoretical Basis of Modern Teaching Methods.....	15
2.6.	Common Characteristics of Active Learning Methods in Physics.....	15
2.7.	Teaching Science in Ethiopia.....	16
2.8.	Physics Teaching and the Role of Stockholders.....	16

CHAPTER 3

3.	RESEARCH METHODOLOGY.....	19
3.1.	Research Design and Method.....	19
3.2.	The Study Setting.....	19
3.3.	Source of Data.....	20
3.4.	Study Population, Sample Size and Sampling Techniques.....	20
3.5.	Tools for Data Collection.....	21
3.6.	Validity and Reliability Test.....	22
3.7.	Method of Data Analysis	23
3.8.	Ethical Consideration.....	23

CHAPTER 4

DATA ANALYSIS AND DISCUSSION.....	24
4.1. Characteristics of Respondents	24
4.2. Methods used for Physics Teaching	25

CHAPTER 5

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS.....	39
5.1. Summary	39
5.2. Conclusions.....	41
5.3. Recommendations	42
References.....	43

Appendices

- Appendix A - Questionnaire for Students
- Appendix B - Interview guide
- Appendix C - Observation checklist

LISTS OF TABLES

Table 1: Number of Sampled Students by Sex from Each Preparatory School

Table 2: Population, Sample and Sampling Techniques

Table 3: Characteristics of the Respondents

Table 4: Students' View on their Understanding about the Content of Physics

Table 5: Accessibility and Utilization of Library Service for Physics

Table 6: Accessibility and Utilization of Laboratory Materials in Physics

Table 7: Respondents' view on Tutorial Classes for the Teaching of Physics

Table 8: Respondents' view on the Use of Active Teaching Methods in Physics

Table 9: Frequency of Teaching Methods Used in Physics Classes

Table 10: Mean and Standard Deviation on the Plasma TV lesson in teaching physics

ACRONYMS

ERR:	Evocation, Realization of meaning, Reflection
ESDP:	Education Sector Development Program
ETP:	Education and Training Policy
MOE:	Ministry of Education
MTM:	Modern Teaching Method
NLA:	National Learning Assessment
NSTA:	National Science Teachers Association
OREB:	Oromia Regional Education Bureau
RTM:	Regular Teaching Method
SD:	Standard Deviation
TV:	Television
WEO:	Woreda Education Office

ABSTRACT

The purpose of this study was to investigate the practices of teaching used by physics teachers in physics course of studies to enhance students' performance at preparatory schools at Jimma Town and Kersa Woreda. To accomplish this purpose, a cross-sectional survey design was employed. Data were collected from 242 randomly selected students and 6 purposively selected physics teachers. Moreover, 2 school principals and 2 Woreda Education Office (WEO) curriculum experts were participated through purposive sampling technique. The researcher used questionnaire, interview and observation tools to collect the relevant data for the study. Data were analyzed using frequency table, percentage, mean and standard deviation, besides using descriptions for the qualitative data. The results of the study confirmed that teachers were found to be less successful in using different active learning methods than dominantly applying the traditional lecture method for all physics contents. Moreover, teachers did not sufficiently engage the students in practical laboratory activities because of scarce laboratory equipment and trained lab technician to support physics lesson. The Plasma Television (TV) lesson presentation is inefficient in allocating adequate time for discussion, the improper pace in lesson presentation and the absence of active interaction between students and plasma teachers. These entangled the students' learning. In order to alleviate those problems that arise from the teaching physics, the researcher recommends teachers to use active learning methods that combine students' prior knowledge with the new lesson that minimize the knowledge gap and pave the way to easily understand new physics concepts. A collaborative work is recommended for school and WEO to create better learning environment, in general and for physics teaching specifically.

CHAPTER 1

INTRODUCTION

1.1. Background

Education is the best way for personal and societal development in any country including Ethiopia. It is for this reason that the government of Ethiopia being cognizant about education and put the issue in different legal documents. The main principles, objectives and goals of education in Ethiopia are enunciated in the proclamation of the constitution of the Federal Democratic Republic of Ethiopia of 1995, and reference here the Education and Training Policy and the Education Sectors Strategy of 1994, and reference here Education Sector Development Programs (ESDPs I-V). In all these documents, education is viewed as an excellent instrument to bring up good citizens and to reduce poverty through the development of science and technology.

As part of the education field of study, physics knowledge plays a primary role in science and technology. Its application has increased productivity and improved economic and industrial development in many countries of the world (Wambugu, Changeiywo, & Ndiritu, 2013). In order for a developing country like Ethiopia has a globally competent economy and gain cultural development; physics education plays a crucial role. It is for this reason that the Education and Training Policy (ETP, 1994), has given greater emphasis for science from primary school to the higher levels of education. For instance, the policy clearly stated in one of its objectives that citizen to show positive attitude towards the development and dissemination of science and technology in the society.

We provide quality school education for our students, to develop their potential to the full and to prepare them for the challenges in life (OREB). Likewise, in the Ethiopian ESDP the government's priority for natural science is also reflected by 70:30 professional mix and annual enrolment, at higher education institutions with 70 percent of intake for natural science fields to higher educational institutions and 30 percent in to the social science (MOE, 2010). The government has many reasons to give such priority to physics including its wide range of application in industrial development, entertainment industry and the pursuit of truth by the citizens. All technology has elements of physics due to its emphasis on addressing phenomena

involving the interaction of matter and energy. This interaction is necessary for the technological needs of the changing society (Juceviciene & Karenauskaite, 2004).

In a specific sense, physics education therefore enables the learner to acquire problem-solving and decision-making skills that provides ways of thinking and inquiry which help them to respond to widespread and radical changes in industry, health, climatic changes, information technology and economic development. These changes are demanding knowledge of scientific principles in order to tackle them as Kleeves & Ai Kenhead (1995); Mohanty (as cited in Wambugu & Changeiywo, 2008). The teaching of Physics provides the learners with understanding, skills and scientific knowledge needed for scientific research, fostering technological and economic growth in the society, where they live to improve the standards of living (Minishietal, 2004).

But, to gain such values from the teaching of physics, a good way of lesson presentation and method of teaching is very essential. According to Biadgelign (2010), teaching methods are general means, manners, ways, procedures or steps by which a particular order is imposed upon teaching or presentation of activities. Methods of teaching also signify a constellation of systematic arrangements and techniques that cast to fit curricular elements consisting of educational goals, objectives and outcomes in line with the maturity and readiness level of students. A more specialized meaning of teaching methods, according Biadgelign (2010), is the sequential or unified arrangement and selection of elements of the curriculum on the basis of their appropriateness to students' developmental levels, and the educational outcomes aimed at, as well as the mainly different ways and techniques by which these are introduced to the students.

The development of teaching methods has been traced back to ancient Greece. The most long-lived and widespread set of teaching methods are those associated with the study of language and literature Singh (as cited in MOE, 1999). Ancient teaching methods focused memorization and analogical reasoning in which one thing is inferred to be similar to another thing in a certain respect, on the basis of the known similarity between the things in other respect (MOE, 1999).

In the contrary, the modern teaching methods use a variety of learner centered approaches that promote literacy and development of life skills such as communication skills, lifelong learning

skills and critical thinking skills. This method includes active learning methods (such as brain storming, clustering, rotating review, inquiry, etc.), techniques of assessment and evaluation (such as peer assessment, self-assessment etc.), portfolio development, and various games and refreshes as NSTA (2004) cited in Hussain (2011) and (Solomon et al. 2010). The above discussion on the use of effective teaching in physics needs a careful attention by Ethiopian physics teachers. This is because the students results in this specific subject is very low as compared with other subjects as identified by MOE (2010/11) educational abstract, in which students' achievement in the (2010/11) national examination is very low as compared with other subjects and expectation of the government. Out of the total students sat on physics national examination for grade 10 only 10.1% scored 50% and above, while 16.7%, scored similar result in the national grade 12 University entrance examination. Similarly the Serbo secondary school grade 10 physics national examination result for three consecutive years 2013-2015 is given in Table 1.

Table 1. Serbo secondary school Physics National examination results (2013-2015)

Year	Score Registered					Number of Students
	A	B	C	D	F	
2013	1	43	146	81	36	307
2014	2	29	194	216	45	486
2015	15	83	212	153	44	507

As shown in Table 1 above it is clear that the majority of the students (1129 students) in percent 6.7% scored grade C and below in physics and only 173 students (13.3%) scored grades A and B in three consecutive years. The above data shows that there is some problem in the school in the area of physics teaching.

When we see the national University Entrance Examination of Jimma Town Preparatory School average students' physics result, similar experience is observed in the past three years. For instance, in 2012/13, 2013/14, and 2014/15 the students scored 41.4%, 45.8% and 38% in physics respectively. This students' achievement in physics of the two schools is also the lowest when compared to that of other subjects.

Achieving the vision of transforming Ethiopia into a middle-income country in 2025 demands transformation of the economy through application of science and technology as instruments to create wealth. In line with the key priorities of the current Growth and Transformation Plan, a large demand is expected for middle and high level human resources. It is therefore critically important to emphasize science and technology so as to produce capable citizens who can contribute to make the country competitive in the increasingly knowledge-based global economy (ESDP IV).

The current students' achievement in physics and the expectation of the government seem divergent. Low student achievement seen here according to Solomon and Kedir (2015) is due to students' weak background in mathematical skills, students' poor ability to think and pose questions, poor English language proficiency and students' lack of interest and motivation to learn physics.

As the national assessment result set in ESDP V shows, the so far decreasing student achievement appeared worsening. In Grade 10, the share of students who achieved an average score of 50% across the five core subjects (mathematics, English, physics, chemistry, biology) stood at 23% in the 2014 assessment. In the same assessment, only 3% achieved 75% or above in their average score. Among subjects, performance in biology was relatively high, with 40% achieving 50% or above and 11% achieving 75% and above. This contrasts with performance in physics, in which 14% and 2% of students achieved 50% and 75%, respectively. Although all results remain low, they do reflect an improvement on the same assessment conducted in 2010, in which only 14% of students achieved an average score of 50% and 1% an average score of 75%. At Grade 12, performance is better, as is expected due to selection on student performance following Grade 10.

In the latest assessment report, 34% of students achieved an average score of 50% across the five core subjects (mathematics, English, physics, chemistry, biology); and 4% of students achieved an average score of 75%. In relation to the same assessment conducted in 2010 these rates reveal a slight decline in average student performance, which carries an implication for the quality of entrants to higher education institutions but is not surprising given the rapid expansion of

enrolment in preparatory education (MOE, 2015). Since it is obvious that there is a mismatch between what is targeted and achieved in terms of students' achievement, serious measure should be taken by the government and the society.

1.2. Statement of the Problem

In many research activities on the effectiveness of preparatory school science teaching a number of factors were identified and a study conducted by Oli (2014) shows that the main factors that contribute to the poor performance of students in science during preparatory school years include several problems associated with the students' attitude, teaching methods, and the teachers' capacity.

Similarly, a study conducted in the secondary and preparatory school students reveals that students had no interest to learn physics (Kedir, 2015). Besides, one can guess that low student achievement in physics education may be the consequence of problem of teacher's methodology of teaching physics or lack of students' interest in the subject. A study conducted in one of the secondary schools at Jimma town indicated that lack of interest for teachers while they are learning the subject is a source of psychological barrier when they are acting as a teacher (Adem, 2005). Wambugu, et al., (2013) pointed out in their study that Kenyan Secondary School students' performance in physics has been low. Low students' achievement is may be the consequence of none attractive teaching method used in teaching physics. As a solution to the low achievement observed on Kenyan Secondary School students, the study conducted on the effectiveness of Experimental Cooperative Concept Mapping Approach (ECCA) is proven to have improved students' physics achievement and conceptual understanding for both boys and girls. The ECCA instructional approach resulted in higher achievement than the RTM.

The reason for the increase in student's achievement could be caused by the students' involvement in explaining and receiving explanation in which the concepts can be easily represented in maps, understood and applied to real life situations. ECCA gives more space and opportunities for students to discuss, solve problems, reflect on the concepts, provide ideas and help each other. The students reflect on the activities critically by sharing reaction and observation and then generalize by applying the ideas to real life situation. Or, the mentioned teaching approach highly facilitates active learning. The study conducted in the context of Kersa

and Jimma preparatory school students is also based up on low students' achievement in physics and research is being conducted on the teaching methods used by physics teachers. As a remedial measure, it is stated in AAPT (2009) that the class room of a qualified physics teacher is an active learning community where the students: work in groups, conducting meaningful experimental investigations, build and test scientific explanations, engage in thought provoking activities, and conduct inter-group discussion of each other's argument. Husain (2011) also stated that science class rooms may be fully equipped with apparatus so that the teachers are facilitated to use inquiry teaching method. In the grades 11 and 12 physics syllabus of our country high emphasis is given that teachers should use active learning teaching strategies while teaching physics. Despite huge financial investment and considerable man power participated in the educational system, the students' physics achievement is far below from the set target.

As shown in the findings of different researchers in the field of physics, students fail to register good results as a result of lack of interest and poor attitude towards the learning of physics subject, poor background in the subject, problem of English language proficiency and the like. But this study focused on the methodological aspects of physics teaching and related factors that contribute to low students achievement in physics in the study area. This because ineffective teaching methods and other factors undeniably can affect the quality of physics teaching learning and students performance in the subject. Having this in mind, the researcher needs to investigate the teaching methods used by physics teachers in preparatory schools of Kersa Woreda and Jimma Town. This enables the researcher to mark out the various problems face the teaching of physics and to put forward some solutions to alleviate the practical problems in teaching the subject

1.3. Basic Research Questions

For the study, the following basic research questions were formulated.

1. How often do physics teachers use active learning methods in teaching physics at Kersa Woreda and Jimma Town?
2. Which method of teaching is used dominantly or frequently in physics classes at Kersa Woreda and Jimma Town?
3. To what extent is the schools' science laboratory give service to teach physics at Kersa Woreda and Jimma Town?

4. How do physics teachers apply plasma TV in teaching physics in the preparatory schools of Kersa Woreda and Jimma Town?

1.4. Objectives of the Study

1.4.1. General objective

The general objective of the study was to investigate the teaching methods used by physics teachers in physics classes to enhance students' performance at preparatory schools at Jimma Town and Kersa Woreda.

1.4.2. Specific Objectives

The following were the specific objectives of the current study which are parallel with the research questions that guide the study:

1. To assess the implementation of active learning methods in teaching physics.
2. To identify the dominantly used method of teaching in physics classes.
3. To identify the extent to which science lab activity is being practiced by the teachers in their teaching of physics.
4. To find out the role of Plasma TV in physics teaching at preparatory Schools.

1.5. Significance of the Study

The use of active learning method enhance students' performance and contribute to the improvement of the quality of education through improving the practices of teaching and alleviating the various problems face in the classroom. Thus, this study can be useful in the following way:

1. The outcome of this study enable that preparatory physics teachers to recognize the method of teaching they are dominantly using in physics classroom and identify related problems to reconsider their teaching methods based on the findings of the study.
2. The students will be benefitted from this study since their teachers engage them in active learning, and help them to relate physics with their real life situations than hypothesizing physics is a difficult subject having negative attitude.

3. It gives awareness to the school principals to fully support teachers and the teachers to employ their skills and potentials in solving students learning problems in preparatory schools while teaching physics.
4. The findings of the study can draw attention to some of the problems and suggest recommendations for improvement in teachers' method of teaching, thereby enhancing teachers' professional competence skills.
5. The study can initiate other researchers to carry out further research on this problem as educational practice and it provides ways to improve the curriculum at national level to include active learning methods through providing basic information.

1.6. Delimitation of the study

The study was delimited to Jimma Zone of Oromia region Kersa Woreda and Jimma Town preparatory schools which are found at 313km and 335km far respectively from the capital Addis Ababa to the south west. The study was also conceptually delimited on investigating the method of teaching used in physics classes in preparatory schools. This is because effective method of teaching has its own contribution in teaching physics in enhancing students' performance in physics (Hussain,2011).

1.7. Limitation of the Study

The study has limitations which are stated as: This study was conducted in small geographical area of Kersa woreda and Jimma town preparatory schools. Hence, it is difficult to generalize results from this small area to a country level, the zonal, regional or country level. In conducting this study, lack of recent empirical studies were problem to compare results of this study with other previous local studies. However, the researcher simplified the limitation by referring some sources from the internet, going to places where the internet service has sufficient access. In spite of these short comings, attempt was made to make the study as complete as possible with support of the research advisors.

CHAPTER 2

LITERATURE REVIEW

Overview

Much like a woodworker continually acquires new tools to perform different tasks in his shop, educators, too, should search for tools to add to their repertoire of educational practices. One tool is not sufficient to do every task a woodworker must complete, and one teaching method should not be considered sufficient for teaching all topics and meet standards (Warner & Mayers, 2014). This means that physics teachers should in a similar manner use varied methods of physics teaching in their class rooms to develop the knowledge, skill, experience and conceptual understanding of their students.

For doing so teachers are required to make use of teaching methods that incorporate active learning strategies that access students with permanent learning. Here the collaborative work of school principals and the corresponding government officials within the hierarchy of the educational system should have comparable understanding of the purpose of using different modern teaching methods to that of teachers, in order to provide support to preparatory schools.

2.1. Definition of Teaching

The transmission of worthwhile activities, experience, findings, and achievements or in short, cultural heritages of one generation to the next cannot be done haphazardly. That is, the skills needed to perform the functions or roles of the public (community) come systematically through great effort, commitment and diligence. Such activities, according to Brown and his associates (1992), have to be taught and acquired effectively and efficiently. This grand reason is the very cause for the emergence and use of term teaching.

Teaching is defined in different ways by different educators. These definitions range from being traditional (the teacher is the supplier of knowledge, skills and experiences) to being modern (the teacher is the facilitator of student learning). Traditionally, the role of the teacher is seen as a purveyor of information; the teacher has been the source of all knowledge. This suggests the

picture of student sitting in rows in front of the teacher who is talking and transmitting information to them, while they listen passively (Reece & Stephen, 2003, p.13). Nowadays, however, the teacher is the facilitator, a person who assists students to learn for themselves (ibid). This means that, for a better learning of students teachers should establish a teaching method that facilitates students learn in active manner. Active learning not only emphasizes the development of students' skills but also their exploration of their own attitudes and values (Sivan, Leung Woon, & Kember, 2000). When active learning is carried out, simulations, discussions, student presentations, games, role-plays, flip charts and handouts are basic elements of physics lessons.

Active learning consists of three factors, which are inter connected (Mayers & Jones, 1993). These are basic elements; learning strategies; and teaching resources. The basic elements of active learning are speaking, listening, reading, writing and reflecting. These five elements involve cognitive activities that allow students to clarify the question, consolidate and appropriate the new knowledge. The second factor of active learning is the learning strategies that incorporate the above five elements. These are small groups, cooperative work, case studies, simulation, discussion, problem solving and journal writing. The third factor of active learning is the teaching resources that teacher uses to engage students to interact and participate actively in the activities.

2.2. Historical Development of Teaching

Modern education was introduced in Ethiopia under the rule of the Emperor Menelik II (1889-1913) in 1908 that was more than 100 years ago. A school was established and named Menelik School which was probably inspired by the missionary schools taking center stage of the world by the mid-nineteenth century CE. The school was highly opposed by the authoritarian Church that enjoyed a virtual monopoly over education. The Church feared the undermining potential of a state school system managed by the Europeans. The opposition from the Church was overcome by Emperor Menelik II who bowed down against a number of demands of the Church (Negash, 1996, p.101).

2.3. Definition of Teaching Methods

As MOE (1999) states, the term “method”, which was taken from Latin simply implies mode or way. The general meaning of method, according to Azeb (1984, p.90), is an orderly planned progress towards a given or a coordinated system of principles for the performance or conduct of practice. It enables the teacher to select appropriate learning experiences, create appropriate environment, guide and direct learning activities assess and evaluate progress and bring about learning or understanding systematically without unnecessary waste.

Therefore, from this we can understand that, in the world of education, method of teaching is the mode or the way by which a subject matter is communicated in a way that it could properly achieve the intended outcome. Teaching methods are general means, manners, ways, procedures, or steps by which a particular order is imposed upon teaching or presentation of the activities (Biadgelign, 2010, p.99). In clearer terms, teaching methods refer to construction of ‘how teaching ought to be done’.

2.4. Types of Teaching Methods

As many research papers from national and international sores reported the chronic problem in the teaching of physics lies up on lack of interest of the students which led to low achievement (Czerniak & Lumpe, 1996, Hussain, 20011)). Using varied methodology of teaching of physics may lead to the solution of the problem. For the purpose of this research we confine ourselves to the two methods of teaching physics. These are: Traditional Lecture teaching Method and Modern Teaching Methods (Solomon et al., 2010).

2.4.1. Traditional teaching Method

In the traditional method of instruction the teacher delivers lectures and the students listen to the presenter (the teacher). In the lecture method the learner stays a passive recipient of knowledge. With this regard Hoff Arthur (as cited in Hussan, 2011) commented on the nature of lecture method and found it highly verbal in nature and stated that it goes against the philosophy of the teaching and learning of science and reasoning out facts and idea.

Science teachers' beliefs towards best teaching strategies in the school practice are not consistent with the outcomes already existing as a consequence of science education research (Haney, Czerniak & Lumpe, 1996). Nevertheless, several studies have shown that the teachers beliefs and conceptions of science teaching are dominated by traditional approaches aiming at content knowledge transmission and seem to be consistent with their class room practice (Angell et al., 2004; Hewson & Hewson, 1987; Koballa et al., 2000; Lederman, 1999; Tsai, 2002). According to the traditional teaching, science is presented as a rigid body of facts theories and rule to be memorized rather than a way of thinking and knowing about phenomena of the natural world (Hewson & Hewson 1987; Koballa et al., 2000; McDermott, 1993).

2.4.2. Modern Teaching Methods (MTM)

Several models of learning have been invented. One of the easiest and at the same time the most effective is called "frame work for thinking and learning". This model describes learning in the interconnected stages: evocation, realization of meaning and reflection. While following this model the teacher is able to prepare learning opportunities during which students will gain knowledge as well as practice life-skills as NSTA (cited in Hussain, 2011).

Generally, the frame work has the following general principles about knowledge, based on the constructivist point of view: learning is an active process; each student is unique; students' background knowledge is a base for learning, and learning is both social and individual. This method is a variety of learner centered approaches that promote literacy and development of life skills such as communication skills, lifelong learning skills and critical thinking skills. This method includes active learning methods (such as brain storming, clustering, rotating review, inquiry, etc), techniques of assessment and evaluation (such as peer assessment, self-assessment etc), portfolio development, and various games and refreshes (Solomon, 2010).

2.4.2.1. Inquiry Method

The inquiry method of teaching according to Biadgelign (2010, p. 155), can be employed to any subject area most of the time, at higher institutions and at secondary school. Inquiry method can be seen, according to Joyce and Weil (as cited in Dunkin, 1988, p. 63), as a process for interpreting of unusual or problematic situations or phenomenon. The method, students inquire into the nature of a problem with a view of finding some answers why the problem exists.

Inquiry method in science education has two meanings: method of teaching of science subjects and science as inquiry. Inquiry Method of Teaching: this method of teaching and learning of physics promotes students center philosophy, in which the teacher`s role is as a guide or a facilitator, and teachers leave the students or learners to discover solution of scientific problems themselves.”Inquiry is a powerful way of knowing science subjects, students learn how to ask questions” and to find the solution of questions by applying evidences as NSTA (cited in Hussain, 2011). Science as Inquiry: this is sources through which students gain knowledge, and developing the skill of inquiry. For instance, it includes identification and investigation of problem, formulation of hypothesis, collection, analysis and interpretation of data, then drawing conclusions as NSTA (as cited in Hussain,2011).

The advantage of this method tends to generate enthusiasm and interesting in the students since students find things for themselves, they remember them better. It permits teachers to model the values and attitudes essential to an inquiring mind such as reasoning skills (NSTA (2004). But, the main disadvantage with this method is time consuming and it may not be possible to use it in all situations at all times, because some of the concepts, issues, ideas, or others may merely be explained, discussed, or lectured in class (NSTA, 2004).

2.4.2.2. Discovery Method

The discovery method, according to Bruner, Wittrock and Cronbach as cited in Brown and his associates (1992, p. 58), has been defined in different ways. Sund and Trowbridge, for instance, take the view that discovery occurs when an individual is involved mainly in using his/her mental processes to discover some concept or principle.

This method has its own advantages and disadvantages. Concerning its advantage Brown et al., (1992) report that this method provides understanding as opposed to rote learning because the focus of discovery activities lies on observation, comparison and explanation by students. It is more conductive method of teaching for the development of thinking skills. It strongly promotes student involvement and success. In the contrary, the discovery method is time consuming because of the divergent student responses. The biggest problem is the skill it demands from teachers.

2.4.2.3. Demonstration Method

As to Walkin (1990, p. 56), demonstration is a practical display or actions involved. Brown and his associates (1992) described demonstration as an audio-visual explanation, emphasizing the important points of a product, a process or an idea. It is basically an activity which combines telling, showing, and doing so as to facilitate the understanding level of students. The main advantage of this method requires the student's to watch the teacher's demonstration attentively. It trains them to be good observers. It is an effective means as an introduction to skill learning. It enables students to acquire knowledge in the first hand form and connects theory with practice (Walkin, 1990).

In this method active participation is reduced for students and they mainly act as observers. When the size of the class is large, particularly those students who sit at the back fail to hear what the teacher is telling them about and at same time, they may fail to clearly observe what the teacher is showing particularly when the thing being demonstrated is so small, or may involve complexities. In short, problems of audibility and visibility may arise. Because the teacher can spend most of his/her time while showing, telling, and doing, he/she may run short of time to examine students' understanding (Biadgelign, 2010; NSTA, 2004).

2.4.2.4. Group Teaching Method

While it can be argued that the individualized learning phase of educational technology probably had a greater impact on modern education and training than the mass instruction phase that preceded it, because it concerns with how people interact and learn from one another. One of the best examples of this method is the discussion method (Biadgelign, 2010, p. 179).

As an advantage this method provides an excellent opportunity for students to practice their oral communication skills, for students are required to forward their views, opinions or ideas in their own words according to their understanding and it provides good practice for problem-solving . But, group learning often requires the active cooperation of the participants if they are to succeed. It may give opportunity for brighter students to show off (Biadgelign, 2010; NSTA, 2004).

2.5. Theoretical Bases of Modern Teaching Method

The overall approach of this method is based on the socio-pedagogical constructivist theory of learning, which assumes that all learners are unique and the most effective way to build their knowledge is through connecting the “old” with the “new” in a meaningful way. If this occurs, learners are more likely to understand the content and also to use acquired knowledge in their everyday life. Socio-pedagogical constructive-ism also argues that information is remembered better if it is gained through an active learning process that encourages learners to build their own knowledge structures. This framework helps teachers convey knowledge in a very effective way. It also serves as the foundation for organizing the methods and delivering the content. The Evocation Realization of Meaning (ERR) framework of thinking and learning divides the learning process in three phases (Solomon et al., 2010):

- A) **Evocation:** it the process during which learners are motivated to retrieve prior knowledge on the given topic.
- B) **Realization of Meaning: it is the** process during which new information presented in an active way and students learn this new information in relation to what they already know
- C) **Reflection: in this case the** process summarizing the new content by the learners.
(Solomon et al. 2010)

2.6. Common Characteristics of Active Learning Methods in Physics

Instruction is informed and explicitly guided by research regarding students’ pre-instruction knowledge state and the learning trajectory, including: specific learning difficulties related to particular physics concepts; specific ideas and knowledge elements that are potentially productive and useful; students’ beliefs about what they need to do in order to learn; specific learning behaviors, and general reasoning processes (Meltzer & Thornton, 2011).

Moreover, different characteristics of active learning were identified in this method including specific student ideas are elicited and addressed; students are encouraged to “figure things out for themselves”; students engage in a variety of problem-solving activities during class time; students express their reasoning explicitly; students often work together in small groups; students receive rapid feedback in the course of their investigative or problem-solving activity; qualitative reasoning and conceptual thinking are emphasized; problems are posed in a wide variety of

contexts and representations. Besides these features, instruction frequently incorporates use of actual physical systems in problem solving; recognizes the need to reflect on one's own problem-solving practice, and emphasizes linking of concepts in to well-organized hierarchical structures.. Instruction integrates both appropriate content and appropriate behaviors (Meltzer &Thoronton, 2011).

2.7. Teaching Science in Ethiopia

The number of secondary school students in Ethiopia during the academic year 1959-60 was 7,590. All the secondary school students take general science during all the four years. A few that want to study medicine, engineering, etc take special biology, chemistry or physics as the case may be. In comparison with those that follow liberal art courses, the number of these students that specialize in the science is very small and well below the demand of the nation (Yohannes, 1960).

2.8. Physics Teaching and the Role of Stakeholders

For the educational success or failure there are mutually accountable stakeholders. These stakeholders include: the school, the teachers, the students and the community.

2.8.1. The school

Good school could mobilize school resources, including teachers properly to improve education quality (Workneh & Tassew, 2013). The school is the most responsible organ for the overall activities of the teaching-learning process in the school. It should frequently checkup for the efficiency of its performance in terms of providing quality physics education that makes students competitive nationally and globally. The school should frequently checkup for the quality of the facilities such as class rooms, libraries with their full equipment including ICT service.

As science laboratories are the key factors for the science teaching, schools should make them functional for effective teaching-learning. In science laboratory students can tangibly realize physics content that they have theoretically learnt in the class room. Science laboratories are places where students can develop skills of creativity, practical work and critical thinking. In the laboratory students even can develop their communication skill while doing practical work in

group and also improve their interpersonal relationship. The school administration, in collaboration with other stock holders, should work hard to make the school compound attractive and, student lovely. The role of school administrators in terms of following up teachers' activities day- to-day is of greater importance to maintain effective teaching-learning. The taking of students' periodic attendance by teachers contributes a lot in avoiding student class- missing, and absenteeism. Every year the school should look for, and, motivate effective research based teaching methods in the school; so that the best practices are broadly used in the school and even shared with other schools (Workneh & Tassew, 2013).

2.8.2. The teacher

A good physics teacher is someone who realizes that among the most and a valued and significant role of science teacher is to help a student understand a body of information and the process of scientific investigation. The teacher derives great pleasure when a student truly comprehends a concept or principle and appreciates the role scientific inquiry had in its development (AAPT, 2009).

Behind the scene work determines the level of student understanding. Quality teaching depends on what is done by the teacher before stepping in to the classroom (AAPT, 2009). Preparation is the key. In this regard teachers: set the goals in terms of conceptual and process outcomes, decide what students will do in the classroom to achieve these goals; decide how to assess whether the goals are achieved, including the roles of both formative and summative assessments; maintain a positive outlook and be flexible, and prepare subject material: sequencing and correlating to standards; prepare lab apparatus and equipment (National Research Council, 2005).

Moreover, pedagogical knowledge and pedagogical content knowledge has great significance for physics teachers(AAPT 2009). Physics teachers understand what constitutes effective teaching. Physics teachers should, at minimum, have had appropriate experiences leading to demonstrable understanding of the following elements of pedagogical knowledge. Physics teachers understand how to develop learning outcomes for science teaching that incorporate state and national

standards for teaching science, and select appropriate curriculum materials to meet standard base outcomes.

They understand the logical connection between the topics of the curriculum, the need to build on each other, and to create learning progressions. They are aware of the “depth and breadth” conundrum of science teaching, and have an understanding of how to appropriately balance transmission and constructivist approaches to teaching and learning. Physics teachers are expected to possess skills of teaching including preparation, instructional delivery, *student ideas*, *meta cognition*, *inquiry teaching*, *assessment*, *technology*, *learning environments* (National Research Council, 2005).

2.8.3. The Students

The contribution of the school, the community and the teachers without active student participation will be of no advantage. Students should obey the school’s rules and regulation during their stay as a student in the school. They should not waste learning time because of absenteeism. For better achievement they should attend their class room lesson in their 1:5 (one-to-five) organized student body, so that mutual support and understanding of content of the lesson could be enhanced.

2.8.4. The Community

Communities have contributed significantly to the development and the expansion of education (MoE, 2010). The contribution of students’ parents in school activities is highly significant. This ranges from fulfilling educational materials for their children to providing financial and labor support to schools. On the other hand, the community should also get access to check up at home for what their children learn daily. Parents should sometimes come to school and checkup for the fact that their children fully attend classes or not. Thus the joint effort between the community and the school provides strong support to the teaching-learning process of the school.

CHAPTER 3

RESEARCH METHODOLOGY

3.1. The Research Design and Method

In this study, the cross-sectional survey design was employed. This design was chosen because it can provide sufficient information concerning teaching physics in preparatory schools of the study area. In addition, it helps to draw valid generalization and conclusions. The data collected for this study was collected at one point in time. Consequently, the quantitative research approach was used by supplementing it with the qualitative method in order to answer all the basic research questions with valid and adequate data from various sources.

3.2. The Study Setting

The study was conducted in Oromia regional state, Jimma zone particularly in two preparatory schools called Jimma Preparatory School and Serbo Preparatory School. The former school has long years of service in providing secondary education, whereas, the latter has small years of service. The primary intention of the researcher was to conduct the research at Serbo Preparatory School alone. However, because the no of participants is small, he included jimma preparatory school in the study. The first is found in Jimma town the capital town of the administrative zone while the latter is found in Kersa Woreda (the previous woreda for the administrative Jimma town). The administrative town Jimma is located at 335km while Serbo town is located at 313km by road southwest of Addis Ababa. Both Jimma and Serbo town lie in the climatic zone locally known as *Woyna Daga* which is considered ideal for agriculture and human settlement (Yonas, 2002). The two schools are the only preparatory schools in the towns providing educational service for students who come from rural kebeles and Jimma town as well as the woredas found in the administrative Jimma zone.

3.3 Source of Data

The study accounts of more primary and secondary data. The primary data was gathered from questionnaire filled by the students and from teachers using semi-structured interview, as means of confirmation to the response given by students besides the data collected by observation. In addition to this, the secondary source of data was used to get important information on students' result from the preparatory school report and national exam results from the MOE Website.

3.4 Study Population, Sample Size and Sample Technique

In Kersa Woreda and Jimma Town preparatory schools, there were 25 grade eleven and twelve sections with a population of 1424 students. Out of the total sections 13 were selected by using simple random sampling technique. Thus, the total number of students in the sampled grade eleven and twelve sections becomes 689 out of which 364 were males and 325 were females. Finally, 242 students (128 males and 114 females) are taken as sample size of the study based on Krejcie and Morgan (1970) Table for Determining Sample Size from a Given Population. In my study area, the population is more than 600.

Table 2: Number of Sample Students by Sex from Each Preparatory School

Name of the School	Male	Female	Total
Serbo Preparatory School	24	13	37
Jimma Preparatory School	104	101	205
Total	128	114	242

Moreover, in the selected preparatory schools, there were a total of 6 physics teachers. All of them were taken as a sample by availability sampling. In addition to these, 2 school principals and 2 education office curriculum officers are included in the study by purposive sampling.

Table 3: Population, Sample and Sampling Techniques of Each School

Respondents	Preparatory Schools						Sampling Technique
	Jimma		Serbo		Total		
	Popn	Sample	Popn	Sample	Popn.	Sample	
Number of Sections	22	11	3	2	25	13	Simple Random
Number of Students	583	205	106	37	689	242	
Teachers	5	5	1	1	6	6	Availability
School Principals	1	1	1	1	2	2	Purposive

3.5. Tools for Data Collection

In order to collect relevant data from the respondents the researcher used semi-structured interview, questionnaire and observation.

3.5.1. Questionnaire

The students' questionnaire consisted of students' personal information; their level of physics subject understanding; issues concerned with school facilities such as the school library and science laboratory services; teaching methods the physics teachers use while teaching physics and the application of plasma television in teaching physics.

Questionnaire is used to collect data from the students to know their views and experience on teaching methods used by physics teachers. The researcher developed the students' questionnaire from literature. The questionnaire has two main parts and twenty one close and two open ended items that are assumed to address the basic research questions. This was distributed to the selected students to obtain their views concerning the teaching of physics.

3.5.2. Semi-structured interview

Since the number of teachers in the study area was six conducting semi-structured interviews with the teachers become appropriate measure. The interview has ten questions developed from literature. The interview helps the researcher to gather in depth information on the methods of teaching used by physics teachers and the problems they face in the study area.

3.5.3. Observation

The researcher used check list to observe the teachers use of various method of teaching and the attention given to the active learning methods of teaching in their lesson presentation and the students' interaction in the physics classroom. This data helped the researcher to validate what was identified in the questionnaire and interview results. The observations were conducted by getting permission from physics teachers in advance. The researcher used a checklist that focused on the method of teaching for three to four observations per a week. In the classroom the researcher observed the lesson plan and how the teachers implement it. The researcher further made a tick on the selected methods of teaching used by the teacher to identify the dominant one from the other methods used in the classroom.

3.6. Validity and Reliability Test

In this study, the content validity of the questionnaire was examined using expert review. Two other physics teachers gave comments and unnecessary items were rejected and improvements were made to unclear items. To ensure the reliability of the tools in this study, a pilot test was conducted prior to the actual data collection. The pilot study was conducted on twenty students from Asendabo preparatory school. The objectives of the pilot test was to check out the clarity of the contents of each item, the consistency of items under each theme, relevance of the questions for the study area, and to see the difficulty of the language. To check the reliability of questionnaire, Cronbach's alpha was calculated through SPSS version 20.0 windows. Accordingly, the reliability of the items was found to be 0.709. This indicate that the reliability was moderately good since a Cronbach's alpha between 0.70 - 0.79 moderately reliable and acceptable as to the guideline set by (Cohen, Manion and Morrison, 2007).

3.7. Methods of Data Analysis and Presentation

The collected data from questionnaires and interview were analyzed and presented by the combination of quantitative and qualitative data analysis method. The following data analysis methods were employed by using SPSS version 20.0, and based on the nature of the basic research questions and the data collected from the respondents regarding the teaching methods used by physics teachers at preparatory schools of Serbo and Jimma Town. The SPSS is needed to make the analysis easy and accurate. To present and analyze the quantitative data frequency, percentage and mean as well as standard deviation were used while the qualitative data reported by respondents through the semi-structured interview was presented thematically under the appropriate theme of the study. Here the content analysis was emphasized.

3.8. Ethical Considerations

To be ethical, the researcher first got a letter of support from department of Physics – Jimma University. Consequently, the researcher presented the support letter to the education offices and to the schools to get their permission. Then the researcher contacted the respondents and clearly informed them about the purpose of the research. Also, the sample participants of the study participated with their full oral consent. Every effort was made to keep participants anonymous and confidentiality.

CHAPTER 4

DATA ANALYSIS AND INTERPRETATION

This chapter of the study presents the data collected from different groups of respondents through questionnaires and interviews. The purpose of this study was to investigate the teaching methods used by physics teachers in physics classes to enhance students' performance at preparatory schools of Jimma Town and Kersa Woreda. In order to achieve this purpose, 242 questionnaires were distributed to sampled students. The return rate of the students' questionnaires was 100% since all of them filled and returned the questionnaire at one time in the classroom with the support of the researcher. Moreover, 6 physics teachers, 2 school principals and 2 education office curriculum officers were interviewed. The following analysis was made based on this response rate.

4.1. Demographic Characteristics of the Respondents

In this part the characteristics of the respondents such sex, age and level of education was presented, analyzed and interpreted.

Table: 4 - Distribution of Respondents' Characteristic

No	Variable	Category	Respondents		
			Students		Teachers
			No	%	No
1	Sex	Male	128	52.9	6
		Female	114	47.1	0
		Total	242	100	6
2	Age	15-16 years	32	13.2	-
		17-18 years	130	53.7	-
		19 years and above	80	33.1	-
		20-30	-	-	2
		31-40	-	-	3
		Above 41 years	-	-	1
		Total	242	100	6
3	Level of Education	Grade 11	166	68.6	-
		Grade 12	76	31.4	-
		Degree	-	-	4
		MSc.	-	-	2
		Total	242	100	6

As depicted on item 1 Table 4, 128(52.9%) of the student respondents were males and 114(47.1%) of them were females. Moreover, all the 6(100%) teachers, 2(100%) school principals and 2(100%) curriculum officers of the study area were males respectively. This indicates that the majority of respondents are males because of the proportionality of the respondents in each category and respective school. Therefore, the preparatory school physics teachers and leaders of the study area are by male dominated.

With regard to the age categories of the respondents, the majority i.e. 130(53.7%) of the students are found between the age of 17-18 years while 80(33.1%) of them fall between the age of 19 and above. On the other hand, 3(50%) of teachers were between the age of 31-40 and 2(33.3%) of them were between 20-30 years. Only one teacher is above 41 years old. This finding showed that the majority of the teachers are matured enough to support the students and experienced to provide adequate information on the teaching methods used in teaching physics.

With regard to the educational level of students and teachers, it is shown that the majority 166(68.6%) of the students were grade 11 and 76(31.4%) of them were grade 12. This can be because of the focus of the study was preparatory school and the sampling technique used in the study. Out of the total teachers, 4(66.7%) of them were first degree holders while the rest of the teachers 2(33.3%) had second degree. Hence, the majority of the teachers did not meet the criteria to teach at the preparatory schools although they are attending their Second degree at different universities. This is because teachers with second degree are expected to teach at preparatory level (OREB, 2007). This has its own contribution for the improvement of the education quality and for effective implementation active learning.

4.2 Methods used for Teaching Physics

In this section the analysis and presentation of the data gathered from respondents on the teaching of physics and the methodology used were presented based on questionnaires and interview. The questionnaires were prepared having different types of Likert scale items. Percentage, mean and standard deviations were used to analyze quantitative data. Open-ended items and interview results were also analyzed to support and validate the quantitative findings.

4.2.1 Students' Understanding about the Subject Physics

Table 5: Students' View on their Understanding about the Content of Physics

Items	Variables	Students' Responses	
		No.	%
1. How many of you/your friends understand the concept of physics contents while your teacher teaches physics?	All Student	35	14.5
	Some Students	165	68.2
	Very few students	40	16.5
	None of them	2	0.8
Total		242	100
2. If your response for question No. 1 above is B, C or D what would be the reason?	Language problem to understand concepts	63	30.4
	Mathematical problem	44	21.3
	Way of teachers' lesson presentation	20	9.7
	Students' background knowledge	80	38.6
Total		207*	100

* The total number decreased since 35 participants responded for the first item as "All Students"

In Table 5 item 1, respondents were asked about their/their friends understanding of physics concepts or contents while teachers teach physics. Consequently, the majority 165(68.2%) of the student respondents indicate that some of the students understand physics concepts or contents while teachers teach physics. As to the same question more student respondents i.e. 40(16.5%) reported that very few of them understood physics contents when the teachers teach them.

In the interview with Physics teachers, it was identified that many students fail to understand quickly the concepts of physics and fail to be acquainted with very important contents. Of course teachers disclose that there are very few students who are clever in understanding and can work quickly with their physics teachers (be it Plasma or classroom Teacher) when the teachers used participative method of teaching. This implies that the students' understanding of physics contents is not satisfactory and limited with few students in the actual teaching-learning process.

In order to identify the reason, the researcher asked the respondents what would be the reason in understanding physics contents. As depicted in table 5 of item 2, the majority 80(38.6%) of the students mention that students' background knowledge affected their understanding of physics contents while 63(30.4%) of them believed that English language problem was a challenge for the students. Moreover, mathematical problems and teachers' lesson presentation negatively contributed to lack of students' understanding of physics contents as revealed by 44(21.3%) and 20(9.7%) of the student respondents respectively. In the interview, one teacher reported that his experience. The teacher state that various problems affect students' understanding of physics in the teaching learning process. Among other things lack of students' prior experience and background knowledge of physics, lack of interest to learn physics enthusiastically, lack of good interaction between teacher – students in lesson presentation, problem of English language skills, lack of using supportive experiment and equipment to aid the teaching of physics contents.

Another teacher added that, in teaching physics the students' attitude towards the subject contributes much. He indicated that students' with positive attitude towards the subject participate and understand the subject better than those who view physics as a difficult subject. So the teachers' way of lesson presentation and encouragement for the students' trail is very important and a factor by itself.

Based on the above quantitative and interview data, one can infer that most of the students fail to understand physics contents easily because of their personal capacity problems and other factors like teachers' lesson presentation and classroom management to implement active learning. This is in line with Solomon and Kerdir's (2015) finding which they identify poor background of the students in mathematical skills, students' poor ability to think and pose questions, poor English language proficiency and students' lack of interest and motivation to learn physics.

4.2.2. Facilities required to teach physics

This part focus on the presentation and discussion of data gathered from respondents regarding the availability and utilization of educational facilities or materials for the teaching of physics, laboratory and library as presented in Table 5 and 6. Results from Open-ended items and interview questions were also analyzed to supplement and validate the findings from each close - ended item as necessary.

4.2.2.1 Accessibility and Utilization of Library to Support Physics Lesson

Table 6 Responses on Accessibility and Utilization of Library to Support Physics Lesson

Items	Variables	Students' Responses	
		No.	%
Is there library in your school?	Yes	215	88.8
	No	27	11.2
	Total	242	100
If your response for question No. 1 above is "Yes", are there adequate physics reference books in your school library?	Yes	93	43.3
	No	122	56.7
	Total	215*	100
How often does the library provide service to support the teaching learning of physics?	Always	10	4.7
	Sometimes	57	26.5
	Rarely	121	56.3
	Never	27	12.6
	Total	215*	100

* The total number decreased since 27 participants responded for the first item as "No"

In Table 6 item 1, respondents were asked about the availability of library in their preparatory school to support the learning. Accordingly, most of 215(88.8%) the student respondents confirmed the presence of library. Only 27(11.2%) of the students did know the presence of this facility. This shows that students have the opportunity to library to support their physics learning.

With regard to item 2 of Table 6, the majority 122(56.7%) of the students respondents exposed that there is no adequate physics reference books in the libraries of Jimma Town and Serbo preparatory schools to support students' learning in the classroom. This shows that lack of reference book for this specific subject is scarce with limited contribution and impact on the classroom learning of students and quality of education.

As to the library service provided for the students, the majority of the students, i.e., 121(56.3%) of them indicate that their opportunity to get service from the library is rare since many students used the same library where there is still lack of adequate reference books in those libraries.

In the interview with the school principals, one of the principals from Serbo preparatory school illustrated that there are different problems in relation to library service and in getting reference books since their school is new [Two Years Service]. In elaborating his idea, he said, Serbo preparatory school is a new school function in Serbo Secondary school sharing every resources from them. The library together with the reference books is taken borrowed from the secondary schools. Of course we bought different reference books based on need assessment from students and physics teacher although not adequate as compared with the number of students in our schools. So it is difficult for students to be engaged in active learning and the teachers to support the physics contents with additional reference materials.

Based on the collected data, the library service and the reference books for physics subject was not satisfactory in the study schools. This in turn can affect the effective teaching learning of physics in the actual classroom lesson presentation be it by Plasma and Classroom teacher.

The researcher also go ahead to assess the availability and utilization of laboratory that can help in the process of teaching physics. The next section and Table 7 below present the availability of laboratory and lab equipment in the preparatory schools of Jimma and serbo Towns.

4.2.2.2 Laboratory Service to Support Physics Lesson

Table 7 Responses on Accessibility and Utilization of Laboratory Materials for Physics Lesson

Items	Variables	Students' Responses	
		No.	%
1. Is there science laboratory in your school to support the effective teaching of physics?	Yes	176	72.7
	No	66	27.3
	Total	242	100
2. Is your school science laboratory give service for every planed schedule in a week?	Yes	12	5
	No	230	95
	Total	242	100
3. If your response for item 2 above is "Yes", do you engage in practical activities in the laboratory?	Yes	16	6.6
	No	226	93.4
	Total	242	100
4. If your response for question No. 3 above is "No", what do you think is the reason for?	No clearly set time table for Laboratory	88	38.3
	Shortage of laboratory equipment	105	45.7
	Shortage of time to organize lab lessons	18	7.8
	No demonstration lab/room for only physics	17	7.4
	More focus on plasma TV since it is a must	2	0.9
	Total	230*	100
5. What is the convenient time for science laboratory activity?	During the opposite shift of school time	124	51.2
	During my regular class	112	46.3
	During weekend	6	2.5
	Total	242	100

* The total number decreased since 12 participants responded to the second item as "Yes"

In Table 7 item 1, respondents were asked about the availability of laboratory to support the effective teaching of physics. Accordingly, the majority of the respondents i.e. 176(72.7%) reported the presence of laboratory in Jimma and Serbo town government preparatory schools. Only, 66(27.3%) disagree with the presence of laboratory in the study schools. This showed that laboratory is available to provide service for science subjects in the study schools.

Concerning the provision of adequate service for every planned schedule in a week for the learning of physics by the students, in table 7 of item two, 230(95%) student respondents indicate that the libraries were not giving adequate service for the students as expected by the students for many reasons. Furthermore, the preparatory School Science laboratories fail to engage the students in practical activities in the laboratory room as confirmed by the majority 226(93.4%) of the students.

In relation to this, the students were asked the main reasons for not trying out some practical activities in the laboratory room. Consequently, shortage of laboratory equipment were found to be the leading problem as verified by 105(45.7%) of the total student respondents. This was followed by problems like lack of clearly set time table for laboratory use and shortage of time to organize lab lessons as shown by 88(38.3%) and 18(7.8%) of the respondents as confirmed by the students respectively. From this, it is evident that the Jimma and Serbo Preparatory schools seem to be in relatively less position in terms of fulfilling most of the laboratory equipment as needed in the schools to achieve the intended educational objectives specifically in physics.

With regard to time constraint, the majority 88(38.3%) of the students illustrated that the convenient time for science laboratory activity was in the opposite shift although the service found to be inadequate in the study areas of Jimma zone. Further, analysis of the interview data showed that there were no adequate lab apparatus and chemicals in the schools.

In this regard one school principal from Serbo Preparatory school said that in their school, there were complicated problems with regard to laboratory service since the school did not have trained lab technician/teacher for laboratory while lack of equipment to support the teaching learning of science subjects like physics. Still lack of chemicals was another problem in the school. Trainings provided by local universities were not matched with our situation particularly in solving the current problems in our laboratory.

In general, from the data presentation and interview, it can be said that Jimma Town and Serbo Town Preparatory Schools had laboratories although they fail to function and provide service to the students and teachers since they did not have adequate laboratory equipment and trained man power to give the needed service although laboratory is obviously a backbone to ensure the effective teaching learning of science subjects and better student understanding of the lessons.

With this regard, Cardak, Onder and Dikmenli (2007:3) indicate that laboratory equipments and method of teaching supported through such materials enhance the activeness of the students and carries great value in terms of providing meaningful education. As to these scholars, laboratory is a place where new information is developed by sighting, developing ideas and interpreting the data by students. Other researchers indicated that there is a significant relationship between students' and teachers during experimental classes since the laboratory work inculcates scientific reasoning among students and enhances their performance (Godwin, Adrian & Johnbull, 2015).

4.2.2.3 Use of Tutorial Classes to Teach Physics

Table 8: Respondents' view on Tutorial Classes for the Teaching of Physics

Items	Variables	Frequency and Percentage	
		No.	%
1. Does your teacher frequently get you in the opposite shift to help you through tutorial class supported with active learning?	Yes	43	17.8
	No	199	82.2
	Total	242	100
2. If your response for question No. 1 above is "No" in what activities do you participate during the opposite shift of your school time?	Tutorial program for different subjects	62	31.2
	ICT class schedule	73	36.7
	Physical education schedule	6	3
	Make-up classes for different subjects	22	11.1
	All are common activities	36	18.1
	Total	199*	100

* The total number decreased since 43 participants responded for the first item as "Yes"

As depicted in table 8 item 1, 199(82.2%) of students reported that their teachers did not frequently get students in the opposite shift to help them through tutorial class supported with active learning. However, the rest 43(17.8%) of the student respondents showed the presence of such practice. The researcher further looked what the students do in the opposite shift, and accordingly the majority 73(36.7%) of the student respondents indicate that ICT class schedule is implemented while tutorial program for different subjects is also another program adjusted in the opposite shift. In the interview teachers reported that students are very busy in the opposite shift. So it is difficult get and support students in improving their physics skills and knowledge through tutorial classes for students.

4.2.2.4 . The Use of Active Teaching Methods in Physics Lesson

Table 9: Respondents' view on the Use of Active Teaching Methods in Physics Classes

Items	Variables	Frequency and Percentage							
		Always		Sometimes		Never		Total	
		No.	%	No.	%	No.	%	No.	%
1. How frequently does your teacher use the following method of teaching in teaching physics?	Lecture method	185	76.4	51	21.1	6	2.5	242	100
	Demonstration methods	33	13.6	153	63.2	56	23.1	242	100
	Inquiry method	30	12.4	53	21.9	159	65.7	242	100
	Discovery method	22	9.1	77	31.8	143	59.1	242	100
	Group methods	29	12	138	57	75	31	242	100

As depicted in table 9 item 1, the students were asked to rate how often their teachers use the lecture method in teaching physics. Accordingly, the majority of the respondents i.e.185(76.4%) reported that their teacher use lecture method always. However, 51(21.1%) and 6(2.5%) indicated that their teachers use this method sometimes and never respectively. From this data one can understand that the lecture method is practiced always by physics teachers.

When the respondents asked to what extent the demonstration method is used in the teaching learning of physics, 153(63.2%) of the student respondents asserted that the physics teachers apply the demonstration method sometimes. As to the same question 56(23.1%) of the respondents reported that their teachers never used this method in teaching physics. Thus, the use of demonstration method in the school is not used adequately to support the teaching of physics.

Concerning inquiry method, 159 (65.7%) of the respondents revealed that they never see when their teachers use such method in teaching physics. However, 53(21.9%) indicated that their teachers use this method sometimes. Based on this data, one can say that physics teachers of the study area did not prefer to use the inquiry method of teaching in their classes.

With regard to discover method of teaching, 143 (59.1%) of the respondents confirmed that they never see when their teachers use such method in teaching physics. However, 77(31.8%) said that their teachers use this method sometimes. Hence, it is possible to say that physics teachers of the study area still never try to use the discovery method of teaching in their physics classes.

The results of table 9 also showed a majority of student respondents 138(57%) reported that the physics teachers use the group teaching methods in physics classes. However, 75(31%) said that their teachers never used this method. This show that different group teaching method is used by physics teachers in the classroom.

In the observation, it was identified that majority of teachers frequently used the lecture method of teaching as compared with other active learning methods. Of course, the researcher observed that out of four teachers, three teachers use question and answer, demonstration method and group teaching method in teaching physics sometimes although the researcher never observed when teachers use inquiry method of teaching in physics classroom.

Based on the analysis of the data, one can concludes that teachers use very few method of active learning and/or student centered method of teaching in physics classes. This further limits students' interaction and cooperative learning among students.

Table 10: Frequency of Teaching Methods Used in Physics Classes

Items	Variables	Frequency and Percentage	
		No.	%
1. Which method of teaching is dominantly implemented by physics teacher during teaching physics?	Lecture method	145	59.9
	Demonstration Methods	28	11.6
	Inquiry method	16	6.6
	Discovery method	10	4.1
	Group teaching methods	43	17.8
	Total	242	100

When respondents asked about the dominantly used method of teaching by physics teachers, in Table 10 the majority 145(59.9%) of the respondents indicate that the teachers use the traditional lecture teaching method dominantly in teaching physics. The rest of the respondents 43(17.8%), 28(11.6%), 16(6.6%) and 10(4.1%) reported that other group teaching methods, demonstration, inquiry and discovery methods of teaching were implemented in teaching physics. The bar graph (Figure 1) shows graphically how students experienced and teachers used the lecture method and other active learning methods in teaching physics.

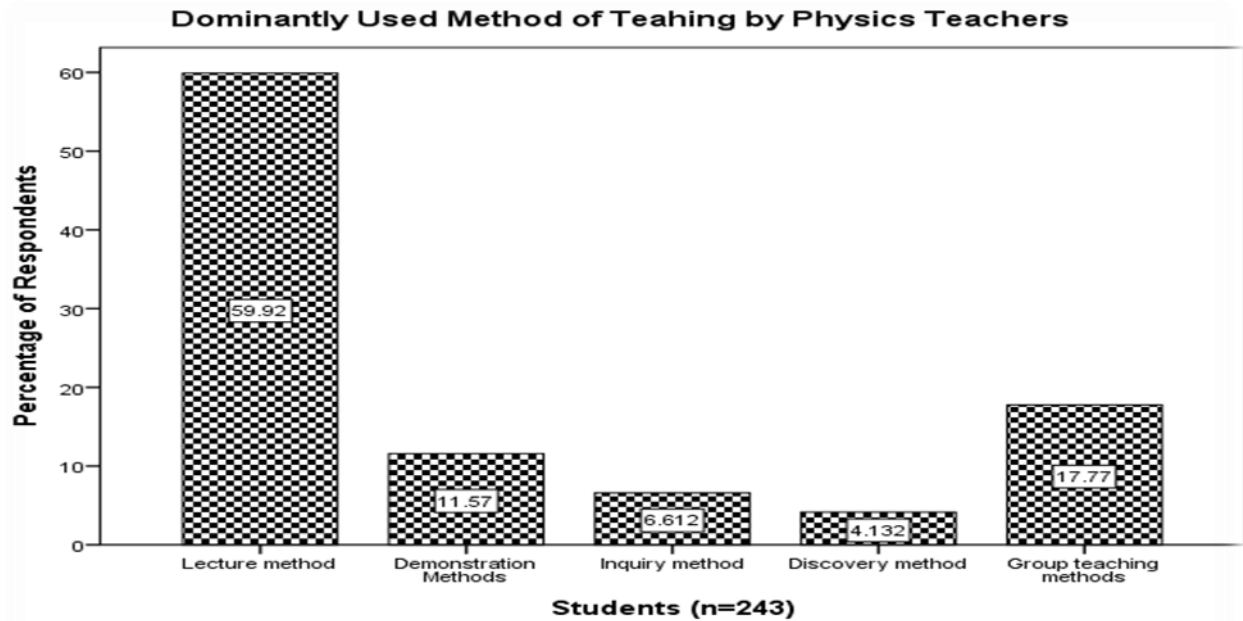


Figure 1: Dominantly used method of teaching by physics teachers

Besides the quantitative data, interview was conducted with physics teachers concerning the dominantly used teaching method in teaching physics and the implementation of active learning methods in physics teaching. Out of the interviewed six teachers, three (50%) of the teachers responded that they preferred to implement the lecture method dominantly in their physics classroom because it helps them to cover the bulky text book in the mandated period of time and the classroom with large class size. The other teachers reported that they use the lecture method together with other methods such as demonstration method and different group teaching methods by organizing students in the classroom. These teachers additionally stated that, even though they made attempts in using student centered teaching method by building small student communities in the class room, they could not be successful. This is because of the fact that their students' weak communication in English language to discuss about physics contents. In this regard one of the school principals says the following concerning the use of different teaching methods:

In my classroom observation as instructional supervisor, I have observed that physics teachers propose to use active learning methods in their daily lesson plan, but they practically apply lecture method frequently. They use small groups sometimes to enable learners discuss on some contents.

The other principal in reflecting his experience said, “Although we encourage physics teachers to use active learning methods, they prefer to use lecture method usually since they believe it saves time”. In whole, basing on the result of this study and interview responses given by the respondents, it is possible to say that the teachers in preparatory schools of Serb and Jimma town most often implement lecture method of teaching than using active learning methods in physics classes. This in turn hampered students’ involvement in real teaching learning process.

4.3. The Role of Plasma TV Lesson Teaching in Implementing Active Methods

It is clear that teaching learning needs the use of various teaching methods. The Plasma has its own contribution in teaching physics although it can replace the role of the teacher. Therefore, this part of the analysis examined the plasma lesson in teaching physics and related problems in the respondents’ views.

Table 11: Mean and SD of Students on how is the Plasma TV lesson in Teaching Physics

No.	Items related to Plasma TV Lesson Teaching	N	Mean	S.D.
1	Supports active learning always	242	2.00	1.043
2	Imposes limitations against active learning because the plasma teacher use a lot of time	242	2.88	1.341
3	Use only the traditional lecture method since students unable to interact with plasma teacher	242	3.61	1.381
4	Avoids the students’ actual manipulation of laboratory materials during the given video lesson	242	3.53	1.314

Scales: ≤ 1.49 = “*Strongly Disagree*”, $1.5 - 2.49$ = “*Disagree*”, $2.5 - 3.49$ = “*Undecided*”, $3.5 - 4.49$ = “*Agree*” and ≥ 4.5 = “*Strongly Agree*”

Table 11 presented the role of plasma TV lesson teaching in physics subject and other related methodological issues in relation to the teaching of physics as follows.

In Table 11 item 1, students were asked to give their response whether plasma TV supports active learning always or not. The mean score of students respondents (M = 2.00, SD = 1.043) showed that the respondents disagreement on the issue. The respondents believe that plasma did

not assist the real implementation of active learning methods. The interview made with the teachers give supportive evidence to confirm the students response and revealed that the plasma of course bring real situations in video and movable pictures but students and teachers cannot test and check things by themselves as it is possibly done in the physics laboratory. Of course, the researcher observed when Plasma teacher invite students to have discussion on the lesson contents and request teachers to facilitate the discussion among students in the specified time.

As to item 2 of Table 11, students were asked whether plasma TV imposes limitations against active learning because the plasma teacher use a lot of time or not. So, the mean scores of the students ($M = 2.88$, $SD = 1.341$) clearly show that the respondents unable to decide if plasma TV imposes limitations against active learning because the plasma teacher use a lot of time.

In Table 11 item 3, when respondents asked whether the plasma TV use only the traditional lecture method since students unable to interact with plasma teacher or not. Accordingly, the student respondents mean score ($M = 3.61$, $SD = 1.381$) show the agreement of the respondents on the issue. Hence, it is possible to say that students unable to interact with plasma teacher actively than listening the lecture and the lesson presented by plasma teacher.

In the interview with physics teachers, it was clearly identified that active learning methods facilitate better students learning, but from their point of view teachers believe that plasma TV lesson presentation fail to involve students in active learning methods of teaching since the time provided for discussion is not adequate and they face problems to follow the plasma teacher since the transmission is fast. Concerning the same issue one teacher had this to say:

A part from its positive lesson presentation, the plasma teacher provided very limited time to classroom teachers after the plasma instruction. The problem is more difficult when coupled with English language problem. This can affect the participation of students in physics contents provided for discussion. Teachers cannot adequately support students in their group discussion too.

Moreover, as presented in Table 11 of last item, student respondents were asked whether the plasma TV lesson presentation avoids the students' actual manipulation of laboratory materials during the given video lesson or not. Accordingly, the mean score ($M = 3.53$, $SD = 1.314$) showed the agreement of the respondents with a verbal interpretation "Agree" towards this item.

In the same way, the data obtained from interview items reflect similar response by the teachers and school principals.

From the above data analysis, it is possible to deduce that apart from some of its positive contribution, the role of Plasma TV lesson presentation has its own limitation in terms of allocating adequate time for discussion, lack active communication between Plasma Teacher and students etc. The finding of this study is not congruent with the suggestion provided by Solomon and Kedir (2001) that sated teaching should encompass a combination of lecture, accompanied by multimedia (Plasma) and practical demonstrations, tutorial and range of laboratories.

CHAPTER 5

Summary, Conclusions and Recommendations

5.1. Summary

The general aim of the study was to assess the teaching methods used by physics teachers in physics at preparatory schools of Jimma Town and Kersa Woreda. To this effect, the descriptive survey method was employed. In addition to this, from the sampled preparatory schools of Jimma town and Kersa woreda 242 students, 6 teachers, 2 principals and 2 education office curriculum experts totally 252 respondents were participated in the study as sources of information for this study. Questionnaire, interview, and observation were utilized as data collection instruments to get the appropriate information from the targeted respondents.

The quantitative data were analyzed by using frequency table, percentage and mean and standard deviation while the qualitative data from open ended items, interview and observation used to supplement the quantitative data. In doing so, the data collected from both quantitative and qualitative instruments addressed the following basic research questions of the study:

1. How often teachers use active learning methods in teaching physics?
2. Which method of teaching is used dominantly or frequently in physics classes?
- 3 To what extent is the schools' science laboratory giving service to apply active learning in practical laboratory work to teach physics?
- 4 What is the role of Plasma TV in teaching physics in Preparatory Schools?

On the basis of the above data analysis and interpretation, the researcher comes up with the following major findings in relation to the basic research question:

- The results of the study on the understanding of physics contents and/or concepts showed that most of the preparatory school students fail to understand physics contents because of their personal capacity problems and other factors like teachers' lesson presentation and classroom management skills in physics classes as revealed by 68.2% of the respondents. Interview results also complemented with this idea besides exposing that students' background knowledge and lack of interest to learn physics affected their understanding.

- In the study, it is identified that the teachers of Jimma and Serbo Preparatory schools were less successful in using different methods of teaching in physics classes than dominantly applying the traditional lecture method as confirmed by more than 60% of the respondents. This type of teacher centered approach cannot bring change in the students understanding of the subject. Observation findings and teachers interview results also clearly showed their idea that most of them use lecture method than other teaching methods that centered the students.
- The findings of this study also revealed that the Science laboratories of Jimma and Serbo Preparatory Schools fail to engage the students in practical activities in the laboratory room as confirmed by the majority 226(93.4%) of the students. Results also showed that the schools lack some crucial laboratory equipment needed to provide practical physics lesson and activities at the laboratory room.
- Findings confirmed that teachers did not frequently get students in the opposite shift to help them through tutorial class supported with active learning as shown by 199(82.2%) students. Besides this, lack of reference books for physics is impeding the students' understanding and group as well as individual learning.
- Concerning the contribution of Plasma Lesson, the researcher found out that apart its some of positive contribution in inviting students to have discussion on physics contents, the role of Plasma TV lesson presentation has its own limitation in terms of allocating adequate time for discussion, lack active communication between plasma teacher and students besides avoiding the students' actual manipulation of laboratory materials during video lesson as confirmed by the mean scores of students ($M = 3.53$, $SD = 1.314$) and interview responses.

5.2. Conclusions

Based on the above data presentation and findings, the following conclusions were drawn:

- ☞ Most of the preparatory students in the study area fail to understand physics concepts since the students' had poor background knowledge, lack of interest to learn physics, personal competence problems and inactive lesson presentation by teachers. Such conceptual difficulties have their own influence on the students' academic performance in physics subject and can impede the objectives set to enhance science fields of study in Ethiopia.
- ☞ The teachers in the study area were less successful in using different methods of teaching in physics classes than dominantly applying the lecture method. Such teacher centered method of teaching for all physics contents entangled the permanent learning of students and affect their ability to relate physics to real life situations.
- ☞ Teachers did not sufficiently engage the students in practical science laboratory activities because of scarce laboratory equipment and trained lab technician. Therefore, teachers are ineffective in providing meaningful physics education through the involvement of students in practical applications of physics at the laboratory room than covering physics contents with solving the usual paper and pencil problems.
- ☞ In this study it was identified that, lack of access to tutorial class supported with active learning is impeding the students' understanding of physics as a group or individual coupled with scarce reference books for physics. Therefore, it is illogical to expect better students' achievement in physics subject where lack of support for students is observed and scarce reference books are common.
- ☞ The majority of students respondents confirmed that Plasma TV lesson has positive contribution in inviting students to have discussion on physics contents although the role of it has its own limitation as revealed by the mean scores of students ($M = 3.53$, $SD = 1.314$). This limitation is manifested by its inadequate allocation of time for discussion, lack of active communication between plasma teacher and students besides avoiding the students' actual manipulation of laboratory materials during video lesson.

5.3. Recommendations

The use of different methods of teaching, particularly the active learning methods, is a crucial issue in education today to engage pupils in real teaching learning of science fields of study, and it is a corner stone to achieve the educational objective in this regard by providing quality education through creating supportive environment for students. On the basis of the findings and conclusions the following recommendations were forwarded:

- ☞ In order to enhance students' understanding of physics concepts, teachers are strongly recommended to identify the students' prior knowledge before presenting any lesson to assist students in the teaching learning process. They are further expected to convince students to learn physics with full interest by adjusting special tutorial classes for those in problems. Here, real-life exposure can bridge the gap between students' everyday experiences and physics concepts besides enhancing the students' academic performance in physics.
- ☞ As it was concluded in the study, teachers in the study area dominantly apply the traditional teacher centered method of teaching for all physics contents. Therefore, teachers are recommended to reconsider their method of teaching in line with the content taught and the involvement of students in permanent learning. In this regard, instructional supervisors like department heads and school principals need to encourage teachers to implement the active learning methods in the way it facilitates the students' learning. Here the theoretical understand of the active learning methods by teachers should be put in to effect.
- ☞ In order to provide the students meaningful physics education supported with practical applications of physics at the laboratory room and full library service, Woreda Education Office Leaders and school administrators are recommended to solve at least the basic problems of laboratory equipment and trained technicians. They can solve such problems by allocating budget for such services and collaboratively working with local Universities and colleges to get material support and physics teachers' capacity development opportunities.
- ☞ In order to increase the role of Plasma TV lesson presentation in physics, teachers are expected to prepare themselves logically and manage their classroom accordingly to alleviate the problems related to time allocation, students' English language problems, and the pace of the plasma teachers in lesson presentation. Adjusting tutorial class is very vital in this regard.

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Appendix -A: Questionnaire for Students

Objective of the Questionnaire and General Directions

Dear **Student**, the main purpose of this questionnaire is *to investigate the physics method of teaching in preparatory schools of Jimma Town and Kersa Woreda*, and to recommend possible solutions to solve the existing problems based on the findings. Therefore, you are kindly requested to give your genuine and full response to all the questions for the better accomplishment of the proposed study. Be sure that your responses will be used only for academic purpose. Follow the following direction:

- Do not write your name
- Put a tick (✓) mark in the boxes for your responses on the closed ended items.
- Use the space provided to express your opinion for the open ended questions.

I. General Information.

1. Sex : A) Male B) Female
2. Age: A) 15 - 16 Year B) 17 - 18 years C) Above 19 Years
3. Grade Level A) Grade 9 Grade 10C) G11D) Grade 1

II. Main Part

1. How many of you/your friends understand the concept of physics contents while your teachers teaches physics?

- A/ All Student B/ Some Students
- C/ Very few students D/ None of them

2. If your response for question No. 1 above is B, C or D what would be the reason?

A/ Language problem to understand concepts

B/ Mathematical problem

C/ Way of teachers' lesson presentation

D/ Students' background knowledge

E/ If others, specify _____

3. Is there library in your school?

A/ Yes

B/No

4. If your response for question No. 3 above is “Yes”, are there adequate physics reference books in your school library?

A/ Yes

B/No

5. How often does the library provide service to support the teaching learning of physics?

A/ Always B/ Sometimes C/Rarely D/ Never

6. Is there science laboratory in your school?

A/ Yes

B/No

7. Is your school science laboratory give service for every planed schedule in a week?

A/ Yes

B/No

8. If your response for question No. 6 above is “Yes”, do you engage in practical activities in the science laboratory?

A/ Yes

B/No

9. If your response for question No. 6 above is “No”, what do you think is the reason for?

A/ No clearly set time table for Laboratory

B/ Shortage of laboratory equipment

C/ Shortage of time to organize lab lessons

D/ No laboratory/demonstration room for only physics

E/ More focus on plasma TV since it is a must

F/ others, specify _____

10. What is the convenient time for science laboratory activity?

A/ During the opposite shift of school time

B/ During my regular class

C/ During weekend

11. Does your teacher frequently get you in the opposite shift to help you through tutorial class supported with active learning?

A/ Yes

B/No

12. If your response for question No. 10 above is “No”, in what activities do you participate during the opposite shift of your school time?

- A/ Tutorial program for different subjects
- B/ ICT class schedule
- C/ Physical education schedule
- D/ Make-up classes for different subjects
- E/ All are common activities

13. What active learning methods does your teacher frequently implement during teaching physics?

- A/ Lecture method
- B/ Demonstration Methods
- C/ Inquiry method
- D/ Discovery method
- E/ Group teaching methods
- F/ Others, specify _____

14. How frequently does your teacher use the above method of teaching while teaching physics?

Put a tick (√) mark to show your response

No.	Method of Teaching	Frequency in which the methods used		
		Always	Sometimes	Never
1.	Lecture method			
2.	Demonstration Methods			
3.	Inquiry method			
4.	Discovery method			
5.	Group teaching methods			

15. What are the two major problems of your schools to implement the active learning methods?

- A/ _____
- B/ _____

16. How is the Plasma TV lesson in teaching physics? Please show your agreement or disagreement by using a tick following the scales given below:

**1=Strongly Disagree (SD), 2=Disagree (D), 3=Undecided (U),
4=Agree (A), 5=Strongly Agree (SA)**

No.	Method of Teaching	Frequency in which the methods used				
		SD 1	D 2	U 3	A 4	SA 5
1.	Supports active learning always					
2.	Imposes limitations against active learning because the plasma teacher use a lot of time					
3.	Use only the traditional lecture method since students unable to interact with plasma teacher					
4.	Avoids the students' actual manipulation of laboratory materials during the given video lesson					

17. What are the major factors that affect the teaching learning process of teaching?

A/ _____

B/ _____

18. What do you suggest to solve the existing problems of teaching physics in your school?

A/ _____

B/ _____

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Department of Physics

Appendix -B: Interview for Teachers

Objective of the Interview

Dear teacher, the main purpose of this interview is **to investigate the physics method of teaching in preparatory schools of Jimma Town and KersaWoreda**, and to recommend possible solutions to solve the existing problems based on the findings. Therefore, you are kindly requested to give your genuine and full response to all the interview questions for the better accomplishment of the proposed study. Be sure that your responses will be used only for academic purpose.

1. How do you see the understanding of students about the basic concepts and contents of physics while you teach them?
2. Are there any obstacles that hinder their understanding? Mention the major ones?
3. What school facilities and instructional materials support the teaching of physics?
4. How do you see the use of laboratory service in supporting teaching learning in your school?
5. How do you see the use of library service in helping students learning in physics?
6. What teaching methods do you use in teaching physics? Which is the dominant one?
7. What is the significance of active learning in physics teaching? Why?
8. What are the major problems and challenges in teaching physics?
9. How the Plasma TV supports the implementation of active learning in physics?
10. What do you suggest to alleviate these problems for effective physics teaching?

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Appendix -C: Observation Checklist

This observation checklist is prepared to observe the method of teaching used by physics teacher in the classroom and the students' interaction.

Name of the School _____ Date _____ Period _____
 The Section Observed _____
 Teachers Observed (in Code) _____
 Number of students: M ale _____ Female _____ Total _____

Main points/activities observed

Points to Focus on in the Observation

1. What method of teaching the teacher proposed to use in the daily lesson plan? _____
2. Do the teacher planned to use active learning? Yes No

No	Teaching Methods Used	Frequency		
		Always	Sometimes	Never
1.	Question and answer			
2.	Lecture method			
3.	Demonstration method			
4.	Inquiry method			
5.	Discovery Method			
6.	Brain storming			
7.	Group teaching method			

Guideline for Observation: Physics has 4 periods per week. So
 Note: **Always** = the method used in every class (4 period per week)
Sometimes = the method is used once or twice in a week
Never = the method is never used in physics classes

3. How the Plasma TV supports the teaching learning of physics in the classroom? _____

4. Does the plasma supports the implementation of active learning in physics classes?

Yes No