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Problems in the Teaching and Learning of Physics at the Secondary and Preparatory Schools, the Cases Wolaita and Dwuro Zones

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Abstract- The main purpose of this study was to assess the problems in the teaching and learning of physics in the secondary and post-secondary (preparatory) schools of Wolaita and Dawuro zones. The study explored problems in the teaching and learning of physics from the following perspectives: problems related to school facilities, teachers, students, plasma instruction and the extent to which the school is conducive for practical activities. The research methodology employed in the study was a descriptive survey. Purposive, stratified and simple random sampling techniques were used to select the data sources of the study. Educational administrators (principals and vice principals), physics teachers, students, and supervisors at zonal and woreda levels were the subject of the study. Questionnaire and interview were the major data gathering instruments used for this study. Besides, some document analysis and personal observation were made to get additional evidences to the study. Numbers, percentage, mean values, grand mean and mean rank were the statistical tools used to analyze the data obtained from the subjects.

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Abstract- The main purpose of this study was to assess the problems in the teaching and learning of physics in the secondary and post-secondary (preparatory) schools of Wolaita and Dawuro zones. The study explored problems in the teaching and learning of physics from the following perspectives: problems related to school facilities, teachers, students, plasma instruction and the extent to which the school is conducive for practical activities. The research methodology employed in the study was a descriptive survey. Purposive, stratified and simple random sampling techniques were used to select the data sources of the study. Educational administrators (principals and vice principals), physics teachers, students, and supervisors at zonal and woreda levels were the subject of the study. Questionnaire and interview were the major data gathering instruments used for this study. Besides, some document analysis and personal observation were made to get additional evidences to the study. Numbers, percentage, mean values, grand mean and mean rank were the statistical tools used to analyze the data obtained from the subjects. The findings of the study in general, showed that, 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 in those schools. The finding also showed that, teachers' lack of competency in their subject and method of teaching as well as lack of interest and motivation to be engaged in their professional tasks, poor supervision (frequent follow up) from concerned bodies, inadequate availability of instructional materials (laboratory equipment's), Difficulty of following the plasma TV lessons since the transmission is fast, luck of enough time provided for discussion after live broadcast of plasma instruction, absence of teachers and students plasma guide in some schools to make the lesson more clear and poor school facility were the chief problems encountered in the teaching and learning of physics in the secondary and post-secondary (preparatory) schools of wolaita and Dawuro zones. Based on the findings, recommendations are also forwarded to address those problems.

Keywords: science education, physics, learners centered, physics laboratory, plasma, academic performance.

I. Introduction

a) Back ground of the study

Education in general is viewed as development of life process and universal practice of human learning resulting from man's interaction with his social and natural environment. In line with this, Tegene and Tsegye (1999:1) discussed education as a process and practice engaged in by different societies at all stage of development and geared toward shaping an all rounded personality by a harmonious and integrated development of the mental, physical, social, moral, spiritual, aesthetic etc. power of human being.

Science education in particular provides good standards for people and leads to cultural developments. Also scientific development is the most affective factor in enabling on less developing countries in to the main stream contemporary technology and commerce.

It would seem clear that all the developing countries should accelerate the development of science education as learner-centered, teacher-assisted, action-oriented, and project based education program. For rapid development of science education, government, society and industry should be in a co-operation and work together (YaseminGodek, 2004:9).

In Ethiopian context, the Government has recently introduce policy of 70:30 percent professional mix in annual enrolment, with 70% of intakes allocated in to science and technology streams and 30% in to the social science and humanity steams. The rationale behind this initiative is the belief that science and technology are the engines of development and that Ethiopia's prospect hinges on the availability of sufficient stock of national expertise in these fields by its higher institutions (FSS, 2009:161).This shows that, the country has intended to reduce its dependence on the imported expertise and technology.

However, research in Ethiopia indicated that students beginning from lower grades have serious knowledge deficits in science and mathematics; this signifies that the quality of science education in primary and secondary schools, which is critical foundations for latter educational development, is at crisis. At this point it looks imperative to raise some questions related to the 70:30 professional mix proposed by MOE. How it is possible to place 70% of preparatory graduates to higher learning institution in science stream where students have low achievement in science subjects in general and physics in particular (FSS, 2009:162).

Therefore the researcher is extremely interested to identify the problems in teaching and learning physics

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in various secondary and preparatory schools in wolita and Dawurozones and he seeks to indicate possible solution to the problem or at least alleviating some of these problems.

b) Statement of the problem

As discussed in background part earlier, physics is one of the subjects offered in the secondary schools. It is true that, knowledge obtained from the physics is applicable in any technological and engineering work, and also its benefit for developing countries like Ethiopia is unquestionable.

However, the teaching and learning of physics in the secondary schools of the country in general and the wolaita and Dawuro zones in particular have been encountered by many problems.

From my experience in teaching physics in different general secondary and preparatory schools of Wolita and Dawuro zones, lots of problems were observed in the teaching and learning of physics. I observed that, the majority of students in the secondary schools, especially in grade 9 & 10 had no interest to learn physics and this resulted the low achievement in EGSSCE. In addition to this, the students in the preparatory grades (11&12), had also low interest in physics when compared with other science subjects. Majority of preparatory students choose natural science stream only to join healthy related fields when they will be admitted to higher educational institutes, because they assume that, they cannot cope up physics dominated fields like engineering and technology. Also statistics shows that majority of students scored very poor result in the entrance examination to higher educational institutions, besides this, teachers in these schools had low motivation to teach physics, the reason could be due to some problems encountered in teaching and learning of physics.

So, it is necessary to study the problems that affected the teaching and learning of physics in the general secondary and preparatory schools this region. Hence, these problems need special attention to get reliable solutions. Thus, the researchers extremely interested to identity problems in teaching and learning physics in wolaita and Dawuro zones secondary and preparatory schools, and to suggest possible solutions.

c) Objectives of the study

The objectives of this study are: - To examine the problems encountered in teaching and learning process of physics instruction in some selected secondary and preparatory schools in wolaita and Dawuro zones,and to suggest possible solution.

II. Research Design and Methodology

a) Methods of Research

Because this study is aimed at assessing and describing some problem in the teaching and learning of physics in the secondary schools of Wolita and Dawuro zones, a descriptive survey method was designed to be employed as the method of study. The current quality of physics education in Wolita and Dawuro zones secondary schools seems seriously affected by these problems. Thus, the study is expected to identify the problems and provide some remedial solutions for them.

b) Sampling Techniques and sample population

There are a total of about 59 secondary schools in Wolita and Dawuro Zones: Among these schools, 40 of them are general secondary (grade 9and 10) and 19 of them include preparatory schools (grade 11 and 12). In order to gain insight in to the problems in the teaching and learning of physics in these schools, 14 schools were selected for the research work from two categories and the selection was made by employing stratified sampling methods.

Educational administrator (school principals and vice principal), students, physics teachers (including department heads), and educational supervisors at Woreda and zonal level held understudy.

c) Method of data Analysis

Different methods of data analysis relevant to each variable or components were used to examine the quantitative and qualitative responses. The data collected through questionnaire was tailed and computed using number, percentage, mean value, grand mean and mean rank. On the other hand the data collected through the interview, observation and documents analysis was analyzed using qualitative method of analysis. But as Guba /1981/ noted, the challenge of qualitative research is to make sense of the massive amount of data. Therefore, in order to prevent this problem, a systematic interpretative approach was utilized to reduce the amount of data.

III. Presentation, Analysis and Interpretation of Data

This part deals with the presentation, analysis and interpretation of the data gathered from the concerned respondents. It comprise of two main parts: the characteristics of the respondents included in the study and the analysis and interpretation of the data.

a) Characteristics of the respondents

As mentioned earlier in chapter three, the educational administrators (principal and vice), teachers, students and educational supervisors at woreda, and zonal levels were the subject of the study. Questionnaire and interview were major data collection instruments in the study. As previously mentioned in research methodology section as well, the questionnaires were distributed to the teachers and students. Out of these distributed 53 (82.81%) from the teachers and 778 (94.93%) students were filled in and

returned back. Regarding the interview, the prepared interview guide questions were presented to 53 physics teachers and all school principals. All physics teachers and principals responded to the questions.

Information on the school facilities, the number of teacher, book- pupil ratio, class room -pupil ratio, etc. observation and document analysis were made.

In general, due to the assumption that the responses might have some sort of relationship with the problems under study, the characteristics of the respondents have been presented in the following table.

Table I : General characteristics of the respondents. (Work experiences and Grade level of students)

No	Items	Respondents							
		Schools principals (n=28)		Physics teachers (n=53)		Students (n=778)		Educational supervisors (n=12)	
		No	%	No	%	No	%	No	%
1	Sex								
	Male	28	100%	51	96.22	458	58.86	12	100
	Female	-	-	2	3.78	320	41.14	-	-
2	Academic Qualification								
	M.Ed (M.Sc)			1	1.88			-	
	B.Ed (B.Sc)			33	62.26			10	83.34
	Diploma			19	35.84			2	16.66
3	Work Experience								
	Below 5			21	39.62				
	6-10	11	39.28	15	28.30				
	11-15	9	32.14	11	20.76			9	75
	16 and above	8	25.00	6	11.32			3	25
4	Grade students								
	9	-	-	-		197	25.32	-	-
	10	-	-	-		195	25.06	-	-
	11	-	-	-		192	24.67	-	-
	12	-	-	-		194	24.97	-	-

b) Results and Discussion

This study intended to assess the problems in the teaching and learning physics in the secondary schools of Wolita and Dawuro zones. Accordingly, attempt has been made to answer the basic research questions raised in chapter one. Descriptive survey approach was selected to be the method of the study. In line with this, 14 general secondary and preparatory schools were selected and the data was collected from students, physics teacher, school principals and supervisors at zonal and woreda level. Questionnaires for teachers and students, outside class room observation, interviews and documentary sources were used as data collecting instruments. A total of 28 principals, 53 physics teachers and 778 students have participated in the study.

Based on analysis made on the data secured by the above instruments in the specified area, the summary of the findings of the study are presented below as follows:

- Regarding teachers work load 69.81% of the teachers taught 16-20 periods per week. 71.69% of the teachers taught five and more than five sections. Also 73.59% of the teachers taught 2 different grade levels.
- The class of secondary schools in wolaita and Dwuro zones was extremely large when compared to the standard set by the MOE (1995:10), which is 40 per classroom. Above 71.69% of the teachers indicated that the average number of students in their school was between 70 and 80. In this regard, the majority of class room teachers could not checking up their students exercise, homework and assignment. As result the teaching and learning of physics has been highly affected.
- As the data collected showed, besides students background to learn physics, the main problems that encountered in the teaching and learning of physics are

❖ Inadequate space for lab or lab facilities outmode.
❖ Insufficient found for equipment and supply
❖ Insufficient administration or recognition
❖ Insufficient referee books in the library

- ❖ Lack of the teachers and students guide, for plasma instruction
- ❖ Lack of internet service
- ❖ Shortage of the time provided for class room teacher after the plasma instruction.
- ❖ Lack of interest of the teachers to conduct experiments and to plane lesson.

- The data shows, the majority of 81.13% physics teachers were not attend physics related professional development activities in forms, workshop, seminar, panel discussion and so on. However, the majority respondent 63.2% reported that there was a habit of mutual experience sharing and cooperative work among physics teachers in the schools.
- Relatively large number of the students 377 (48.45%) have moderate interest on physics. 66 (8.48%) and 38 (4.88%) had low and very law interest to learn physics, among these 362 (46.7%), 312 (40.10%) and 104 (13.36%) lack interest due to subject difficulty, poor teaching method and plasma instruction respectively.
- Majority of the students 345(44.34%) reported that their teachers explain physics concepts clearly and also 364 (46.78%) reported that their teachers relate physics lesson to real life situation sometimes.
- In the study it was found that most of students had low group work practice and some students with poor and very poor group work practices responded that the reason was plasma instruction and lack of their teachers' initiation to participate in group work.
- As responded by the majority of the students there was no sufficient reference material in their library and due to this most of the students used library sometimes.
- 54.75% students responded that the plasma instruction was good if the time provided for class room teacher was enough, 144(18.50%) respondent students choose class room teacher to learn physics.
- Regarding assessment technique, the majority of the respondent students 413(53.08%) reported that, physics teachers evaluated the students' performance base on mid- semester and final exam. In addition, 353(45.37%) and508 (65.29%) of the respondent students confirmed that the physics teachers sometimes gave class work and home work to the students respectively.
- 607 (78.03%) and 171 (21.97%) students responded that physics class room teacher never and rarely used laboratory for practical work respectively. As the reported, the main reasons were the lack of interest of physic teachers and lack of equipment in the laboratory.

c) Recommendation

Finally, based on the findings of the study, the researcher forwards the following recommendations for the improvement of the teaching and learning of physics in the secondary schools.

Teachers and students plasma guide, students text books and reference materials in the library, should be available in enough quantity and quality Laboratories should be furnished with the necessary equipment's for practical activities. And also there should be properly trained physics lab assistance for setting up apparatus for practical demonstrations and experiments.

- The contents of teaching materials should be up to the standard of students.
- Teachers and school support staff have to be trained in producing improvised instructional devices using raw materials available in school locality.
- Scientific knowledge is continually growing. This along with the changing nature of science education requires the teachers to keep abreast of modern development. Professional reading will keep the physics teacher up to date, and help to maintain an awareness of current topics of interest and recent developments.
- Developing students' curiosity in physics by merely teaching them facts. We need to make physics relevant to their lives. One way of doing this, is by talking about recent scientific developments and tracing these back to scientific principles and historical discoveries.
- Teaching should encompass a combination of lecture, accompanied by multimedia (Plasma) and practical demonstrations, tutorial and range of laboratories.
- The government and stakeholders should increase the attractiveness of a career in physics teaching. For physics teachers to remain both inspired and inspiring they need to be given the support and opportunity to remain up to date.
- There should be professional development activities for secondary school physics teachers organized by MOE, NGOs, or by any concerned bodies.
- There should be on line workshops and seminars for the secondary school physics teachers in order to update them, and also there should be an online physics tutorial written for secondary school physics students.
- MOE shall re-examine its mandatory 'plasma' transmission as only mode of instruction. It should rather be used as a supplement to a learner centered classroom so that students and teachers can make choice in the learning.
- Medium of instruction in the classroom serves as a bridge between the teacher and the learner. However, the weakness of the students in the language of instruction (English) was found to be one of the major factors that influence the teaching and learning of physics, due to this the majority of

students to develop their language ability in the schools, and English teachers should encourage the students to practice conversation inside and outside the classroom.

- And finally, a provision for follow up study of implementation seems to be an urgent need. This would probably be best done if the MOE assigns a 'zonal or woreda physics education supervisor' who oversees the proper implementation of physics curricula.

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