ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

PROBLEMS AND PROSPECTS OF SECONDARY EDUCATION PROVISION IN WEST WOLLEGA

BY

KUMARRA SHIFERAW DUGUMA

JUNE 2004

TITLE: PROBLEMS AND PROSPECTS OF SECONDARY EDUCATION PROVISION IN WEST WOLLEGA

CANDIDATE: KUMARRA SHIFERAW

PLACE: DEPARTMENT OF EDUCATTIONAL PLANNING AND MANAGEMENT, ADDIS ABABA UNIVERSITY

Approval of Board of Examiners

APPROVED BY	SIGNATURE
1. Dr Yalew Ingidayehu Advisor	July 09, 2004 Date
2. Wanna Leka Examiner (External)	July/08/2004 Date
3. _____ Examiner (Internal)	July 9, 04 Date
4. Girma Abebe Chairman, Department of Graduate Studies	Girma Date

List of Acronyms/Abbreviations

AAU= Addis Ababa University

ESDP= Education Sector Development Program

ETP= Education and Training Policy

MoE= Ministry of Education

MOI= Ministry of Information

NGOs= Non Government Organizations

OEB= Oromia Education Bureau

OREB= Oromia Region Education Bureau

REB= Regional Education Office

TGE= Transitional Government of Ethiopia

TTC= Teacher Training College

TTI= Teacher Training Institute

WEO= Woreda Education Office

ZED= Zone Education Department

ABSTRACT

The purpose of this study was to investigate the problems of secondary eduction provision in West Wollega Zone, Oromia Region and thereby to forward recommendations for the improvement of the problems that the study brings to light.

The areas of concern were the qualification of teachers, the provision of textbooks, the organization of school libraries, the provision of science education and also class size.

Out of sixteen secondary schools operating in the zone, 7 of them were included in the study. Necessary data were gathered from zone and woreda supervisors, directors, teachers and students of the sample schools through a series of interview and a set of questionaire.

Some of the major findings include:

- About 21 percent of the secondary school teachers in the study area teach the subjects they were not qualified for;
- Shortage of textbooks is acute at all stages;
- The school libraries and science labratories do not provide satisfactiory services;
- The number of students in a class is more than 81 in all the sample schools.

Recommcndations for the mentioned points are:

The responsible MoE in collaboration with regional government should seek ways to train more teachers and labaratory technicians. Furthermore, schools and WEO's should allocate a cetain amount of fund for the purchase of reference books regularly every year. Finally,it is suggested that OEB need to build a standrdized secondary school at each woreda.

CHAPTER ONE

I. The Problem and its Approach

1.1. Introduction

Education is an aggregate of all the processes through which an individual develops different capabilities and positive values in the society in which he lives (Good, 1973: 202). It plays a decisive role in providing the means through which man can explore the challenges and gifts that the natural environment provides to him. In relation to this, TGE (1994: 1) in the New Education and Training Policy stated that education is a process by which man transmits his experience, new findings and values accumulated through years in his struggle for survival and development. It enables individuals and society to make all-rounded participation in the development process.

As a result, the development of a country is positively related to education, because education is believed to be one of the greatest deriving forces for the well-being and advancement of a country. The technological and scientific achievements, which are observed all over the world, are directly or indirectly, the results of education. These technological and scientific advancements made in every sphere of life have placed man, his education, and his work in a new relationship in which education becomes the bridge between man and his work (Carron, 1996: 73), (Verlag, 2001: 18).

For education to play this role, the school is one of the most important institutions that helps to shape the behavior and way of life of the members of a society. It is the base for socio-economic development. Moreover, it helps to socialize people into particular roles. However, the provision of education in developing countries like that of ours has various problems. This

is true especially at secondary level where it requires an array of qualified workforce and specialized instructional materials and faculties.

Secondary schools have distinct goals and objectives from that of primary ones. Their focus is much more than academic training. According to Gross in Smith (1990: 259), these goals and objectives are preparing students for personal competence and development, family cohesiveness, skilled decision making, moral responsibility and ethical action, civic interest and participation, respect for the environment and global human concern.

To achieve the objectives mentioned above, the quality and standard of the education for the level need to be ensured. This standard and quality of education is closely linked with the education of the teacher, availability and quality of instructional materials and facilities. Hence, no educational system can thrive in the absence of adequate and quality educational inputs.

The provision of secondary education in West Wollega Zone is suffering great challenges at present. Teachers are inadequate in quantity and quality; classrooms are without furniture and are overcrowded; supplies and equipment are provided far less than adequate. Furthermore, science teaching is solely based on explanation; reference books and textbooks are scarce. In connection with these, it is the intention of the student researcher to discern the major problems hindering the program not to attain its objectives and to propose the likely means through which the program will succeed in the future course of action.

1.2. Statement of the Problem

Secondary education serves dual purpose. On one hand, it produces middle level work force that is needed in the different sectors of the economy. On the other hand, it serves as a basis for

higher learning, which enables the production of higher level human power. These objectives can be achieved only if the provision of education at this level is performed qualitatively and quantitatively based on plan.

The introduction of the New Education and Training Policy of 1994 brought significant changes in the provision of education in West Wollega. To ensure more access to primary education in the zone, 210 primary schools were built between the years 1996/97 and 2001/02. Furthermore, 1,842 additional teachers were hired for the level and thousands of textbooks have been printed and distributed (OEB, 2002/3: 22).

According to the above source, the number of primary schools is 502 and the gross enrolment ratio is 84% (OEB, 2002/03:26). On the other hand, the number of secondary schools rose only from eight to sixteen during these years. Teachers hired for this level were only 172. As a result, the gross enrolment ratio could rise from 8% to 15% only. These few secondary schools are found in relatively advanced woreda towns, four of which are owned by non-governmental organizations that require large fee from students. The governmentally owned twelve secondary schools are forced to take far more students than they can accommodate. Even that less than ten percent of primary school completers from 163 primary second cycle schools could get the opportunity of joining secondary education. The vast majority are compelled to be out of the education system for lack of secondary schools at their vicinity.

Even those who have the opportunity of joining secondary education are learning under difficult conditions. The total enrolment has grown at faster rate than that of inputs such as teachers, equipment, facilities and textbooks. This has resulted in further overcrowding of schools and classrooms. Hence, overcrowded students are put in a classroom built below standard and without furniture. The student section ratio rose from 48 to 90. The shortage of

textbooks and other instructional materials is acute. The quality of the education provided is poor. Dropout rates are higher and pass rates are lower. These show major wastage. The qualification and number of teachers is below the required level. The teaching of science education is solely theoretical. On the whole, education in government secondary schools is not being provided satisfactorily in the zone.

The main purpose of this study is, then, to discover the extent of the problems of secondary education provision in the zone and to suggest possible solutions. To this end, the study tries to answers the following basic questions:

1. What proportion of the teachers in the study area are qualified for the subjects and grades they are teaching?
2. What does the provision of textbooks look like?
3. Are the school libraries sufficiently equipped with necessary documents to enable the schools achieve their objectives ?
4. How much satisfactory is the provision of science education?
5. What are the effects of large class on instructional programs?
6. What solutions should be proposed to alleviate the problems?

1.3. Significance of the Problem

The provision of Secondary Education in West Wollega Zone has several problems. Due to these problems the teaching-learning process is not effectively implemented to meet the needs of the society. Hence, the study becomes useful and timely in considering the problems and in the provision of secondary education in the zone. More and more children are recently coming

to secondary education every year. But the necessary educational inputs are not provided at a required level. Hence, the study becomes significant for the following reasons:

1. By identifying the major problems in the provision of secondary education, the study helps providers and responsible authorities to be aware of the depth of the problem and to look for possible solutions.
2. It arouses managers and the community to coordinate their efforts to tackle the problems hindering the provision of secondary education in the zone.
3. It can also be used as reference for those who want to make further study on the topic.

1.4. Delimitation of the Study

It is quite unmanageable to study all issues involved in the provision of secondary education within this short period of time and limited materials. Therefore, this paper is limited to the provision of education in West Wollega Zone particularly in government secondary schools . This is because the secondary schools owned by non-government organizations have relatively better provision of education. Furthermore, the study focused on different educational inputs such as teachers, textbooks, library facilities, chemicals and laboratory apparatus, and also class size.

Hence, the study includes randomly selected sample schools which are listed below.

1 Alem Teferi Secondary School
2 . Boji Dirmeji Secondary School
3. Gimbi Secondary School
4 .Gulliso Secondary School
5. Kellem Secondary School
6. Mendi Secondary School
7. Nejo Secondary School

1.5. Limitations of the Study

The long process taken by the school of graduate studies of AAU to reach on the financial decision of the proposal; the very late release of fund allowed for the study and the students researcher being a regular worker who attends the course through distance learning have created time pressure to gather the necessary information and to organize the study as per the time planned by the researcher. Besides, shortage of transportation to the sample schools was one of the serious problems that could be mentioned. Had it not been for these problems the study would have more depth and could have covered the other secondary schools too.

1.6. Research Methodology and Procedures of the Study

As stated earlier, the main objective of this study was to examine the problems and prospects of secondary education provision in West Wollega zone and to forward some possible solutions that help to alleviate the problems.

Thus, to arrive at this goal, the method of the study employed in this study is a descriptive survey method. The method is selected on the assumption that it helps to gather enough information on the issues under study. As a result, the following population and sampling techniques, data collection instruments and data analysis procedures were applied.

1.6.1. Sampling Size and Sampling Techniques

The sample for the study was West Wollega Zone. The sample area was selected because it is one of the remotest zones in Oromia Region with poor school facilities and inadequate quantity and quality of teachers with overpopulated students. Accordingly, seven secondary schools were taken as sample. These schools are:

1. Alem Teferi Secondary School
2. Boji Dirmeji Secondary School
3. Gimbi Secondary School
4. Gulliso Secondary School
5. Kellem Secondary School
6. Mendi Secondary School
7 Nejo Secondary School

These sample schools constitute about 44 percent of the secondary schools in the zone. Concerning the sampling technique, purposive and simple random sampling was used. In order to ascertain representation, forty four percent of the principals twenty percent of teachers and forty percent of supervisors were included in the sample. As for the selection of students, stratified and simple random sampling methods were used.

1.6.2 Data Collection Instruments and Procedures

The data for the study was obtained from primary and secondary sources. In the secondary data, relevant books, booklets and journals were consulted to support the findings of the study. In addition, available reports and documents regarding the issue have been reviewed. The number of students in class and list of chemicals and apparatus are obtained from West Wollega Zone Education desk.

Questionnaire was preferred for this study because it enabled to obtain a lot of information from many people. Accordingly, two types of self completed questionnaires that include both

open and close end questions were administered to students and teachers. Structured interview was also prepared to obtain additional information from school directors and supervisors.

A pilot test of the data gathering instruments was conducted in two schools namely; Horist Spingis Secondary School and Lalo Aira Secondary school and necessary correction were made before the final study was carried out. Convenient time was also chosen for the respondents in order to maximize the quality of responses and degree of return. The objective of the study was put in clear and understandable statements so as to avoid confusion. Assistants for the distribution and collection of the questionnaire were involved with the coordination of the researcher. The researcher also made a close follow-up during data collection.

As to the questionnaire and structured interview, two types of questionnaires were prepared. A questionnaire for students was first prepared in English Language and then translated into Afan Oromo, but that of teachers was prepared and administered in English Language. Structured interview was also designed in English and administered in the same language.

1.6.3 Data Analysis

The responses obtained from the questionnaire items were tabulated, interpreted and analyzed. As shown in chapter three, there are seven tables in which the responses of the study group were presented. In each table, the reactions of the respondents were indicated in numbers and percentages. The analysis, interpretation and the ensuing discussion, therefore, were based on the results obtained. Next, the views of the interviewees that have been gained from the interview items were used to substantiate the analysis, interpretation and the discussion wherever deemed necessary.

1.6.4. Definition of Terms Used

In order to avoid ambiguity and to have clarity and consistence in the study, the following terms are given with operational definitions as follows:

1. Class size: the number of students enrolled in a class (Knowles, 1977: 312).
2. Profession:- is an occupation usually involving relatively long and specialized preparation on the level of higher education and governed by its own code of ethics (Good, 1973: 440).
3. Qualification:- a recognized indication of educational and/or professional achievement such as examination passes, degrees, diplomas, etc. (page and Thomas, 1977: 281).
4. Region:- an administrative area containing a population whose members possess sufficient historical, cultural, economic, linguistic and social homogeneity to distinguish them from others. (Gove, 1912: 1989)
5. Secondary Education:- Full-time education suitable to the requirements of senior pupils whose ages range from 12 years to 19 years, emphasis is on education suitable to the ability and aptitude of the pupil, (Good, 1973: 679).
6. Teaching load:- the time spent by a teacher on all teaching-related activities, such as classroom teaching, preparation of lectures, assignments and examinations, grading, student counseling, professional development and creative activity (Knowles, 1977: 537).
7. Woreda:- (In the Ethiopian context) an administrative area narrower than a zone

8. Zone:- (In the Ethiopian context) an administrative area within a region whose territory is wider than a woreda.

1.7 Organization of the study

The study is divided into four chapters. The first chapter deals with the problem and its approach which includes introduction, statement of the problem, significance of the study, delimitation of the study, the research design and methodology, definition of terms and organization of the study. The second chapter presents the review of the literature. The third chapter treats the analysis sand interpretation of data. Finally, the fourth chapter is concerned with summary, conclusion and recommendations.

CHAPTER TWO

REVIEW OF RELATED LITRETURE

2.1. The Meaning of Secondary Education

Secondary education is a special phase of part of the total education that denotes the education provided by schools for the purpose of guiding and promoting the development of normal individuals for whom, on the one hand, the elementary school no longer constitutes a satisfactory environment and who, on the other hand, are either not yet prepared to participate effectively in society. These individuals need to be guided by the school so as to be ready for the specialized work of professional schools or the upper division. It is a halfway station between elementary school and higher learning which concentrates on preparing students for college and various vocation (National Middle School Association, 1992: 9; Reed and Verna, 1995: 478).

According to Clark and Irving (1986: 5) secondary schools are formed to provide a schooling for young adolescents in which they would study a curriculum different from that of the elementary but not as advanced as that of the higher institution. Such a school would reduce the number of students dropping out of school by making the content of learning more interesting and relevant to student needs than the elementary school which imposes all pupils to follow a uniform curriculum.

It is believed that the completion of secondary school enables the youth to be competent enough to assume the full range of duties. Among the most obvious of these are the sharing of

civic responsibilities and privileges, assuming of the obligations of establishing a home and family, successful participation in vocational life, academic specialization (Haberman, 1990: 216).

2.1.1. The Purposes of Secondary Education

That common problems of many countries today are related to the educational provision of young people from about 11 or 12 years of age to 17 or 18, that it represents the period between basic primary schooling and the higher education at this stage. The task of providing facilities and teachers is fraught with serious practical difficulties. Such kinds of problems are also felt in secondary education where the most varied talents of students need to be revealed and flourished (UNESCO, 2000: 61).

It is at this level that core elements of knowledge such as language, science, general knowledge etc., are enriched and brought up to date so as to reflect the need for intercultural understanding and the use of science to foster sustainable human development. In other words, greater attention has to be paid to quality and to preparation for life in a rapidly changing, often technology dominated world. Secondary education in particular, plays a dominant part in helping develop the qualities of character that would enable young people to anticipate and adapt to major changes. It further gives students the knowledge, skills and understanding to play an effective role in society, helping them to become informed and responsible citizens.

According to Pierson (1989: 105)and MOI (2002:108) the overall purpose of secondary education is assumed to be the guidance of the adolescent in the achievement of an intellectual and satisfying adjustment to his immediate environment. This statement implies, that secondary education enables younger people to develop their awareness and knowledge

related to the cultural, ethical, social, political, and economic aspects of their environment in which these young people live. Thus, it brings to light bases for reanalyzing the school's services in order to help young people adjust to their immediate environment.

Gross, in Smith (1988: 60) lists seven purposes that modern secondary schools serve. They are: personal competence and development; family cohesiveness; skilled decision making; moral responsibility and ethnical action; civic interest and participation; respect for the environment; and global human concern.

Boyer in Smith (1990: 260) also forwarded four purposes of secondary schools. These include,

1. training students in thinking and writing skills;
2. educating students using a core curriculum that should include foreign language, history, civics, science, mathematics, technology, and health;
3. preparing students for work; and
4. preparing students for community service.

Secondary schools attempt to meet the needs of a variety of students: academically talented, academically deficient, college-bound, vocationally oriented, disadvantaged, and the majority of students who fit in the middle group of intellectual abilities and career aspirations.

By way of conclusion, Lombe (1991: 285-287) suggest that secondary schools ought to see to it that each of its students knows where and how to go on learning most profitably after he leaves the school. For pupils who are to continue their education in higher institutions, this means that the school should actively help each boy or girl both to choose the higher institution most appropriate for him. Parallel to this is the secondary school should take

positive account of the need on the part of most high school students to get and hold jobs once they are through with their schooling. For every student who is to complete his/her formal education, the secondary school ought to provide a necessary minimum of definite preparation for a vocation.

Factors that Affect Secondary Education

2.2. The Need for Qualified Teachers

Of all inputs required to carry out an educational activity effectively teachers are the major component in successfully accomplishing the task. Even the quality of educational program, more than other resources, is largely dependent on teachers. They occupy almost a crucial position in the modern society in that they serve as a bridge to link the society and the educational system (Mendeleyeiv in UNESCO: 1973:14).

Effective teaching is determined by the individual teacher's knowledge of the subject matter and mastery of pedagogical skills which create a strong positive effect on student achievement. This is possible when teachers get adequate preparation and have competence that enable them to carry out their duties effectively.Hence, they will be able to keep and heighten the standard of instruction that they give.

This is to say that,the major actors who play very significant role in secondary education are obviously teachers. Hence these teachers should be more competent than any other group in solving problems within their domain. Richey (1979: 58) recommends teacher for secondary schools need to posses the following qualities and qualifications: a) teachers who have had a methods course perform better than those who have had none; b) bachelor's degree graduates from teacher education programs perform significantly better than graduates in other areas; c)

teachers who have had teaching experience perform significantly better than those without such experience.

Teachers must know what to teach and how to teach to be a competent professionals. They must know the methods of teaching besides their knowledge of the subject matter. In connection to this, Azeb Desta (1984:37) stated that one cannot be a qualified teacher by subject matter knowledge alone unless he is adequately prepared through training in methods of teaching. This indicates that a teacher should be adequately prepared in both the subject matter and methods of teaching if he is to be qualified in the profession.

In addition, Leask in Cohen et al (1996:187) state that subjectt teachers require subject knowledge and professional knowledge. She goes on arrguing that it is not enough for the teacher simply to possess academic knowledge; that has to be translated into effective learning by the students. Morrison in Cohen et al (1996: 187), writes that subject specialists should possess both subject knowledge and pedagogical knowledge. He further suggests that a subject specialist should possess several areas of expertise:

- academic subject knowledge;
- pedagogical knowledge;
- effective interpersonal behaviour;
- enthusiasm and motivating skills;
- understanding of social relations in schools and classrooms;
- understanding of how students learn;
- skills in assessment, evaluation and record-keeping.

Here, it should be clear that the skills, knowledge and professional competence of the teacher are acquired through traing. A teacher needs professional training to be able to understand the needs of the students and to assist them expertly in a more effective way. Besides, training helps the teacher to acquire specialized attitudes, knowledge and skills needed for the job to accomplish his instructional duties successfully. These specialized skills, attitudes and knowledge which the teacher acquires through training help him to teach, to evaluate and follow up the overall progress of students effectively.

Similarly, Goble (1977: 118) have stressed the fact that the teacher's task, is complicated by the interrelationship of social factors. Since his specific functions are very deeply influenced by general goals of education in his particular society, and by the way in which time and circumstances modify those goals.

Accordingly, to discharge their professional obligations effectively, teachers in general and secondary school teachers in particular need to have adequate preparations and training in at least two areas discussed below:

2.2.1. Academic Readiness

A certain knowledge is necessary to teach a certain grade level. That is to say completion of an approved course in appropriate teacher preparation institution should be required of all persons entering the profession. This makes the individuals competent to teach a certain grade level and guaranteed to bring quality in education (Yemane, 1992: 11). Thus, teachers in secondary schools are responsible to bring a large number of knowledge to their pupils. For this reason, they are required to take a greater amount of advanced work in one or more subject areas than do elementary school teachers. Concerning this view, Meyer and Gayle (1996: 43) write the following:

> *Secondary school teachers must be well-educated and competent in their professional skills. These skills are necessary to lead effectively with students in the teacher's classroom. That is they must possess a valid credential or license before they are qualified to teach.*

What is emphasized above is the need for an adequate preparation in the subject or subjects to be taught by a secondary school teacher. Mastery of the subject gives the teacher satisfaction when this mastery is transmitted to his students.

Hence, secondary school teachers need to have command of the specialized knowledge and subject matter needed in carrying forward their duties in a school. According to the Ethiopian education standard, the minimum required qualification to teach at secondary school level requires at least a first degree (MOE, 1995: 10). But practically not only diploma holders but also teacher training institute graduates are currently assigned to teach in secondary school, specially in West Wollega Zone.

Studies of teacher assignments show that secondary school teachers must teach one or two subjects. Thus, teachers at this level need to specialize in a field of major interest and also should to take enough course work in another field to be fully prepared to teach in that field (Ulrich, 1993: 10).

According to Lazerson et al (1989: 63), of many functions that a secondary school teacher performs in schools, none is more important than the academic. This implies that the secondary school teacher, beyond his other duties, must be an academic leader to his pupils, in order to satisfy the academic interest and need of his students.

As basic purpose of a scholarly attitude is to foster cognitive growth of the youth, the scholarly classroom teacher is one who possesses a wealth of knowledge about his chosen instructional field or fields.

2.2.2. Pedagogical Readiness

In addition to his academic ability and preparation, a very good secondary school teacher requires a good deal of pedagogical training and experience since this is not antagonistic to the teacher's role as academician. In general, pedagogical skill is essential in guiding the growth and development of students. This ability to guide human growth and development is the thing that primarily distinguishes the teacher from the parent who also teaches the child, and from any well educated person. Hence, mastering the subject does not guarantee effective teaching (Linda 1992: 51; Lazerson et al 1989: 102).

The aforementioned statements have emphasized the importance of pedagogical readiness of a secondary school teacher. Pedagogy as a discipline is always concerned with the question of what one should be capable of, what kind of person one should be, in order to orient and deal practically with children in specific pedagogical situations. Hence, it directly contributes to the teacher's understanding and skill in guiding learning. They are the elements which help in understanding children and youth, the learning process, the use of methods and materials in instruction, evaluation of pupil growth. As Meyer and Gayle (1996: 43) state, "competent teaches see situations within the classroom and pull instructional strategies from a repertoire of skills to match student needs."

Good teachers have learned many skills, techniques, and methods for helping children learn and for teaching children certain subject matter knowledge, values and skills. How to mange classroom routines, how to plan curriculum programs, how to motivate students, how to introduce new concepts, how to deal with the logical structures of certain subjects in psychologically appropriate manner, how to diagnose learning difficulties are all important

equipment for a teacher apart from the knowledge of the subject matter (Goble and James, 1977: 118).

A well qualified and an effective teacher combines the best of human relations, intuition, sound judgement, knowledge of subject-matter, and knowledge of how people learn-all in one simultaneous act. As effective teachers make the very difficult task of teaching appear easy they are able to teach all kinds of students so effectively that children in fact, do learn.

Carron (1996:80) contend that poor quality teaching indirectly influences grade repetition of students because it leads to the descouragement and demotivation of students. Similarly, Noah and Morrison (1997:134) and Dean (1980:206) state that demotivation and poor educational qualification of teachers were found to be the cause for poor quality teaching which in turn result in poor performance on the part of the students and leads them in the final analysis to grade repetition. The inference is that better qualified and motivated teachers provide better methodology of teaching and guidance services, which may help to improve students' educational performance.

2.3. The Role of Textbooks in the Teaching and Learning Process

The other major factor that influence education is the provision and utilization of textbooks. Textbooks are the single most important instructional tool in the classroom. They have had the longest and most obvious influence on curriculum to the extent of standardizing teaching and instructional practices (Reed and Verna 1995: 328). Textbooks furnish an outline which the teacher may use in planning the work of the semester or the year. Furthermore, they usually contain some serviceable teaching aids, such as pictures, charts, diagrams, questions, problems, maps, summaries, outlines, headings exercises and table of contents. Hence, many teachers refer to the textbook, the teacher's guide and other instructional materials as a

curriculum package, acknowledging its impact (Ornstein, 1992: 167). Lockheed et al (1991: 46) show the key role of textbooks in the quality of education as follows:

> *Because textbooks deliver the curriculum, they are the single most important instructional materials. Nothing has ever replaced the printed word as the key element in the educational process and, as a result, textbooks are central to schooling at all levels. When textbooks are available, instructional time is not wasted.*

Apple in Reed and Verna (1995: 329), points out that the textbook also influences the social climate of the classroom. According to Apple, the impact of textbooks on the social relations of the classroom is also immense. According to this scholar, 75 percent of classroom time and 90 percent of homework time are spent with text materials. Hence, social interaction between students and students, and teachers and students is determined by textbooks.

Sadker, and David (1997: 240), share the same view. According to their assertion students spend from 70 to 95 percent of classroom time using textbooks and teachers base more than 70 percent of instructional decisions on them. Given this heavy reliance on textbooks, there is no doubt that they have a major daily influence on what is taught in schools. In fact, textbooks are so pervasive and so frequently used that they constitute a curriculum of their own.

Another writer, Lewy (1977: 4) also states that textbooks have a major influence on the nature of classroom activity. Teachers' lectures are devoted to explaining difficult issues contained in the textbooks, and students are asked questions in class that could be answered simply by quoting bits of information stated in their schoolbooks. Teaching methods, too, are also dominated by the textbook. Class periods are used to question pupils on the content of the textbook or to check exercises contained in the book. Students spend at least two-thirds of their time using textbooks. Teachers rely heavily on textbooks for instructional content, organization and evaluation. Without question, textbooks and other published instructional

materials influence what is taught and learned in the classroom. By virtue of their influence in determining what content is included and how it is portrayed, textbooks, textbook publishers, and state adoption policies have an impact on not only the knowledge base of students, but also their attitudes and benefits (Haggar, 1991: 96).

2.3.1. The Use of Textbooks

Though some people do not favor the use of textbooks by stressing some aspects of their weaknesses, yet textbooks are one of the most important instructional materials.

Notwithstanding the opposition, the textbook is a most useful tool if we use it properly. As pointed out by may educators, the benefits of textbooks include: organized and sequential instruction of the materials, articulation between grade levels and schools, benefits of the latest knowledge and research, assistance provided to teachers who may not know everything about a subject, and teachers working together to utilize the material in curriculum packages. As a whole the reading level and knowledge base of most textbooks match the developmental level of the student.

Callahan and Leonard (1988: 447), further elaborate the importance of textbooks in instruction. According to their view, of all the materials of instruction, the textbook has the most influence on teaching content and method. For most teachers, it has been the be-all and end all of their instructional life. They further state that many teachers would be practically helpless without textbooks, particularly beginning teachers and older ones whose knowledge of the subject is no longer adequate to the need of modern life.

It is possible to conclude from what has been stated above that experienced teacher of good preparation and superior abilities may employ the textbook as their major source of knowledge along with other aids-lectures, discussions, problems and visual and auditory aids.

Clark (1986: 287) advises how a textbook should be used as follows:

> *If it presents only one point of view, we must find to present other view points; if it is dull, we must supply spices; if it omits essential information, we must supply another source that will furnish the missing data; and if the text is difficult to read, we must help the students master its language, vocabulary, style and organization patterns. And finally, if the students will not read the textbook, as opposed to cannot read it, you must find some way to entice them*

Lee (1985: 93) argue that textbooks form knowledge that need to be possessed by the students who are aspiring to acquire skills, attitudes and well defined scientific and historical truth.

Though some educators agree on the wise use of textbook, Callahan and Leonard (1988: 447) stress the fact that textbooks have to be viewed as a teaching tool whereby it serves as an aid and as a means to an end that should not be allowed to dominate or replace the teacher.

The above citation indicates that the use of textbooks is indispensable and unavoidable. But what one has to do is to rationalize its usage. That is the harm comes only when the user follows it blindly. The user should at all times keep in mind that the textbook is not the course itself but only one valuable instrument for teaching and that it must be used intelligently. It has to be noted that a textbook must be supplemented by a wide variety of instructional materials.

Regarding this point, Eric (1998: 205) states that many best teachers do not rely solely on textbooks or permit their instructional activities to be limited by it. He further suggests that the textbook has an important function to serve in schools and the harm comes when 1) schools follow it rigidly by excluding other types of experience, and 2) teachers rely extensively on a dull, routine, recitation-type of teaching centered around the textbook. He,

thus suggested that textbooks should be used in schools not as the only means but that can be supplemented by other teaching materials.

On the whole, it is important to remember that textbook authors and curriculum specialists work with a broad audience in mind. They have no way of knowing about the specific needs, interests, and abilities of the students in the teacher's class. Knowing this is the teacher's responsibility, just as it is up to him to see that textbooks and curriculum guides are adapted to fit these needs, interests and abilities. This freedom to modify and transform the official curriculum has led many to conclude that the real curriculum is whatever teachers actually choose to do in their classrooms.

2.4. The Use of Libraries

A library is regarded as a reception center for the assembly of communication of every description covering books, pamphletes, newspapers, periodicals, maps, microfilms, photographic slides, audio tapes and vidio tapes(Dean,1972:18). These materials are systematically organized and arranged to enable users to easily identify the needed documents.

A school library serves a schools's needs in that it is the working tool of education. In it are stored information, ideas and opinions which will provide the basis for learning by pupils. Furthermore, it is described as the center of the school's intellectual life and it is there to serve and make possible the school's teaching program. A lively and effective teaching program in any school depends on a well organized library.

According to Rossoff (1992: 193), an academic library is the heart of the school anatomy and the library in high school teaching reaffirms the fundamental role of the classroom instruction. Since the role of the school is essentially curriculum enrichment, it follows that it is intensely

concerned with course of study content. Hence, the essential purpose of the school library is to help students find the media of information which they need to carry out classroom assignments and to satisfy their own personal interests.

To achieve this purpose, a secondary school library will need first of all an adequate, up-to-date and comprehensive stock. The range of materials include also those subjects which are taught in the school, and also those which reflect the students' other interests in recreation and hobbies.

Furthermore, the secondary school library need to have enough space to accommodate 10%students at any given time. Besides, trained personnel are necessary to promote effective service of the library and encourage students to develop a life-long reading habit (Library Association,1972:13)

2.4.1. Libraries Reinforce Independent Learning

Basically independent study involves the pursuing and acquisition of knowledge and skills by students with limited assistance from their classroom teachers. This is in contrast to the imparting of knowledge from teacher to student through lectures, demonstrations and discussion.

The tradition of teaching and learning in most school subjects is that of memorizing important facts. To change this tradition involves developing a new attitude on the part of students and teachers so that learning becomes an experience in inquiry. The inquiry or discovery method which makes the student a main actor in the pursuit of knowledge is unquestionably impossible in schools that are without libraries (Purton, 1982: 10).

We know that independent study is not new, certainly, much of what we know is learned outside the classroom. The student's natural quest to satisfy his curiosity leads to a great deal of independent study. As far as formal education is concerned, the practice of homework and other activities out of classrooms are attempts of giving some guidelines in this important areas.

2.4.2. The Importance for Independent Learning

Independent study fosters self-direction. Self-direction is one of the most important objectives of education. It is hoped that by the time a student graduates from secondary school, he would have developed a high sense of self-direction and motivation. Unfortunately, much of the education in schools today is teachers talking and students listening. If pupils are to have an opportunity to develop self direction, they must have an opportunity to experience it through independent study (Rossoff, 1992: 203).

The practice that teachers continue to require students to memorize large doses of information, extracted from inadequate textbooks most of which is obsolete and most of which is forgotten once the test papers have been graded can no longer serve the purpose fully. The practice was inherited from an earlier stable period in history, when there were comparatively few facts to be learned. The fact is that this method cannot succeed in the world characterized by unprecedented social and technological changes, bursting accumulations of knowledge, and a distributing uncertainty about the facts themselves.

We live in a world of change. The amount of knowledge is accumulating very rapidly. Half of what one studies today will be obsolete in ten years. Half of what he will need to know is not yet known by anyone. It is evident that one of the primary functions of education is to help

student" learn how to learn." Emphasizing the issue of keeping pace with the fast changes that take place in our world, Dummer (1998: 59) states most effectively as follows:

> *More than ever, the educated person will be appraised according to his ability to think, to discover, and acquire information about men and affairs. What the library profession must do to help students meet such a requirement is clear. However, it cannot prepare a student to search effectively and to find information independently unless sufficient facility and time is allotted for the instruction it must impart.*

The idea of allotting sufficient facility and time so that students get the opportunity for independent study has merit. Students cannot possibly learn everything they need to know about themselves and the world around them in a few school years. Even if they could, much of what they learned would be obsolete by the time they become adults. A far more valid goal for education is the development of habits of reading and study which endure long after formal education has ended. It is absurd to think that education can be effected through daily does of encapsulated knowledge from a textbook (Carruth, 1994: 311).

Furthermore, libraries make printed materials permanent. These permanent materials can be revisited, reread, and deepened at leisure. A well stocked school library can thus be one of the most powerful stimulants to that personality of the young in the education system. The remarkable philosopher Charles Babbage wrote: "Remember that accumulated knowledge, like accumulated capital, increases at compound interest but it differs from the accumulation of capital in that the increase of knowledge produces a more rapid rate of progress" (Library Association, 1979: 5).

The Second Education Sector Development Program states that libraries will be organized by providing them with sufficient reference books hence at least 2,500-3,000 books are supplied to each school library in the country.

Basically, well-stocked libraries prepare students from different backgrounds and with different aptitudes to live in a world the future characteristics of which cannot be predicated.

2.5. Science Education Provision

This sub-section focuses on the provision of science education with particular reference to the teaching of science and the methodology employed in teaching. The relevance of science to the future of society is more likely to considerably influence human needs than in the past. Some of the pressing problems of society today are related to the rapid decline in the quality of natural environment, depletion of natural resources, increasing poverty, hunger and illiteracy in many countries and regions of the world. Solutions to these problems and the like are based on science to provide remedial measures (Pontifical Academy of Science, 2002: 34).

This implies that science has become an integral part of modern life and modern education in Ethiopia. This has given a very significant place to the teaching of science as briefly discussed below:

2.5.1. How Science is to be Taught

According to encyclopedia Britannica (1993: 856), no system of theoretical, ideas and technical terms qualifies as scientific unless it comes to grips with empirical facts in some way and helps to make them more intelligible. To acquire such scientific knowledge systematically in depth, the most important means is the teaching of science, that should be give an increased emphasis in enhancing student involvement in scientific investigation through laboratory work and filed study. The emphasis arises from the view that science cannot be effectively learnt from books and lectures alone and neither can it taught by simply telling students about science. In order to learn science, one must do it. That is, a student has

to be involved in a real scientific investigation. Real scientific investigation does dual purposes. On one hand, it gives the student knowledge of the subject, and on the other, it provides the learner some understanding of scientific processes (Mekuanent 1992: 19-23).

The view that science is best learnt by doing it is not controversial. Indeed, science teaching cannot be properly accomplished by solely depending on the theoretical teaching. Teaching it involves giving students the opportunity to find and discover the relationship between and among facts, materials and events; to put them in their own way and come up with their own conclusions and generalizations. Observation, demonstration and experimentation are the most important means for the achievement of this goal. Barrass (1982: 4) has suggested the following:

> *... remember that what you read is not necessarily either complete or correct. Scientists do not have too much respect for authority; and if you read books by specialist, you will find that there are many subjects upon which experts disagree. Also there are many questions to which scientists do not know the answer.*

It is during investigation that a student explores ideas, tests hypothesis and raises questions. It is during laboratory and fieldwork that the student begins to understand the frustrations as well as the achievements of scientific investigations. The learner also learns that it is the interpretation of the data gathered during investigations that produces the conclusions of science, and that it is this interpretation and conclusion that challenges older scientific knowledge and raises new questions that lead to further enquiry.

2.5.2. Lecture Versus Other Methods of Teaching Science

The weakest part of science education in developing countries is sill in the area of experimentation by the students. It is true that economy has been and still is the limiting factor

in many cases. This was often aggravated by an almost complete dependence upon very well-made equipment from the industrialized countries.

This condition forces the secondary schools in poor countries to rely on the lecture method of teaching which is the most commonly used and the most frequently abused teaching method (Baez, 1976: 94).

Lectures have been called or regarded as out of date. They have been criticized for discouraging active participation of students in the learning process. In a lecture approach, it is obvious that much materials is covered but a relatively small amount is retained (Baez, 1976: 96). Furthermore, it is reported both by authorities and students that the lecture method of teaching is boring, poorly organized and redundant. They also insist that lectures limit their involvement and fail to take account of individual difference (Gage and David, 1988: 401-402).

Although criticisms have been loud and hard, there are others who defend lecturing, who find it invaluable for surveying a whole field of knowledge, and for arousing active interest that leads student to understanding.

Pro-lectures argue that it is important to separate the faults of the method from the faults of the lecturer. For instance, it is the fault of the lecturer, not the method, if the material is boring, poorly organized and irrelevant. Moreover, the failure to accommodate individual differences is not only a flaw of the lecture method of teaching but a flaw in other teaching methods.

Gage and David (1988: 401-402) summarized the views of writers as to when the lecture method is suitable and when it is not. The lecture method is suitable when:

a) The basic purpose is to disseminate information

b) The material is not available elsewhere

c) It is necessary to arouse interest in the subject

d) it is necessary to provide an introduction to an area or directions for a learning task that is going to be taught through some other teaching methods.

On the other hand lectures are inappropriate when;

a) Objectives other than acquisition of information are taught.

b) Long-term retention is necessary

c) The material is complex, detailed or abstract.

d) Learners participation is essential to achievement of objectives.

e) Higher-level conductive objectives (analysis, synthesis, evaluation) are the purpose of instruction.

Even though the lecture method is favored for some aspects of its merits, the amount of retention with time is greater in the activity methods of teaching like demonstration, laboratory, experimentation.

The study conducted by White and Ted (1974: 90-96) also clearly showed that students exposed to demonstration augmented with lecturing benefit more than those who attended the same material through pure lecture. The above discussion implies that the lecture method can be effectively employed (particularly in the teaching of the natural sciences) if it is systematically synchronized with demonstration, laboratory work and experimentation.

2.5.3. The Increasing Importance of Using Other Methods than Lecture

According to Green (1984: 22) and Akalewold (2003: 67) biology should have a strongly marked practical basis in a school laboratory. There are many reasons for this which are bound up with the nature of the subject, its purpose in school life, its significance for life after school. As a school subject, biology should include practical work because it is a study of practical phenomena, i.e. the events of the living world. (Green 1984: 22) further comments, "to neglect or minimize practical work is to cut out one of the great groups of relations, i.e., the dependence of theory on observed facts." This suggests the importance of demonstration and practical work in science education.

A further and very valuable function of demonstration is to allow pupils to conduct experiment for others to see. Furthermore, demonstration according to Sachs (1970: 5) offers the experimental basis of science especially when laboratory instructions is impossible.

The teaching of physics, Roger (1970: 42) stated, is far beyond supplying information. It is concerned with conveying to students the nature of physics, what it does, how it grows in strength of knowledge, and how it is done-hence the demonstration method.

Coombs (1990: 547) wrote that especially beginning students do have problems in distinguishing physical concepts. And through demonstration of physical concepts, he came to the knowledge that interaction with phenomena or exposing students to direct experience facilitates grasping of physical concepts.

Furthermore, Bartlett (1970: 164), Jensen (1970: 260), Newman, (1994: 236 and Roger (1970: 26) unanimously emphasized the uses of demonstrations in teaching physics. They stated that demonstrations show important phenomena, enliven lectures show the experimental basis of physics, teach factual knowledge, etc. These are the invaluable benefits one can get from this

method of teaching. The implication is that the rate of retention is higher in using the demonstration method.

Chemistry is an experimental science and is chiefly based on the information in the laboratory. Hence the chemistry laboratory provides with the environment where a learner can actually observe the phenomenon studied in the textbook. It is, then, impetrative that one must work systematically in reproducible results (Sharma, 1993: 1).

2.6. Provision of Instructional Facilitates and Materials

According to Lewis (1989: 301-304) and Temechegn (2002: 57-58) some of the ways in which students learn science are the following:

a) Experimenting: it is one of the chief ways of learning science principles and generalizations. Experiments should be conducted so that they will make pupils to think. An experiment, in which the teacher tells the students everything, obviously gives no food to growing minds. Students should realize that they are experimenting, not to discover information for the first time, as is the case with scientists, but for the purpose of understanding scientific ideas. A problem can better be solved by doing experiment than by reading, explaining or showing.

b) Observing - This is also another essential activity in all science teaching. Through the use of their senses (touching, seeing, smelling, hearing and tasting) children can come to experience many things. Feeling the texture of material or heat from an electric wire attached to a dry cell, seeing cloud formations, seeing the changes in lights of shadows, listening to birds, and many other similar activities are important parts of their science work. They make learning more vivid.

c) Reading: The accumulated facts gathered by scientists as an outgrowth of their studies of nature have resulted in a large body of verified knowledge. This knowledge is a systematized body of basic concepts and principles surviving centuries of ceaseless tasting and refinement. This organized and systematized body of knowledge is the product of scientific investigation which are learnt through reading. But reading is only one of the ways to learn science. Schools have, however, traditionally overemphasized this product of science and under emphasized or forgotten the process of science. Science reading should be done to verify conclusions, answer questions, solve problems, find information, learn how to do experiments. In reading, several sources need to be consulted so that each source supplements the other.

d) Discussion: This provides the teacher the opportunity to find out much about the students to evaluate quickly the concepts and misconceptions possessed by the students. After students have spent some time experimenting or reading, the teacher can profitably use the discussion time for an informal evaluation time which can provide him with information which will help him plan further learning activities for individual learners.

e) Educational trips: This can take place depending upon a given purpose and program. This time is when the purpose of the trip will be exploratory and will offer many specific areas for further study. Carefully planned and carried out educational trips can bring nature and scientific facts together for a broader and more inclusive program. Erosion of soil from the bank of the playground, the change of trees and shrubs on and around the school grounds, power lines carrying electricity to the school, the zoo, the telephone exchange, the airport, the water purification plant, etc., are worthwhile trip.

On the whole, science teaching should aim at mastery or understanding of principles and generalizations as well as the development of abilities to observe, classify, use numbers, measure, communicate, predict, infer (data interpretation) formulate hypothesis experiment and so on (Temechegn, 2002: 57).

Besides the methods of teaching and learning, science education demands well organized supply of facilities and equipments.

2.6.1. Special Science Room

If science studies are to progress, secondary schools should contain adequate facilities and materials. Science teaching is to be more than a mere "read and discuss" type of program (Brubacher, 1996: 69). For this purpose, a special room set aside for science facilities and materials is very much desirable. This room can be used for special science projects, science equipment and supply storage. In this room are stored pieces of equipment that are more expensive or delicate (Brubacher, 1996: 72).

2.6.2. Activity Areas/ Demonstration Areas

The needed equipment, supplies, and other facilities should be readily and easily available for making, assembling, experimenting, and demonstrating in science. This area should be well-lighted, should contain running water if possible, electrical outlets, and a source of heat. For an active student performance, there must be adequate space to work (Brubacher, 1996: 73).

2.6.3. Storage Areas

Items that are not needed frequently or are dangerous, expensive, or delicate may be kept in this room. The items stored in the room are discharged only on request by a science teacher (Brubacher, 1996: 73).

The standard set by the Ethiopian Ministry of Education in 1995 for the teaching of the different branches of science (namely biology, physics and chemistry) in Ethiopian secondary schools strongly emphasizes the use of equipment, apparatus and chemicals.

Furthermore, the 1994 Education and Training policy emphasizes the importance of the necessary educational inputs. It read as follows:

> *In order to promote the quality, relevance and expansion of education, due attention will be given to the supply, distribution and utilization of educational materials, educational technology and facilitates. /ETP 1994: /*

Similarly, (MoE,2002:27) states that science laboratories will be equipped with apparatus and laboratory technicians shall be assigned to each secondary school.

Despite the decisiveness of these educational inputs in science teaching, laboratories, laboratory equipment and apparatus are extremely scarce in the study area.

2.7. Class Size

Class size is the number of students to be taught in a given class. Nowadays in most nations of the world, class sizes are growing larger and larger to the extent of running out of manageable size. In a UNESCO survey, Rassekh and Vaideanu (1987: 42) states that the school enrollment explosion started in the 1950s in which the growth was particularly marked in secondary and higher education.

This tremendous growth in school population has made the class size a matter of wide discussion among many scholars and the people concerned about education though no universal agreement was arrived at. That is because different countries have their own ways of arranging class size based on their economic development and kind of program. But all agree that the smaller the class size, the better the learning (Wade, 1980: 63).

What constitutes a desirable size for classes in the secondary school is a controversial matter. Some aspects of the secondary program can probably be carried out under highly skilled teacher as effectively in classes of forty, fifty or even sixty pupils as they can be done in classes of twenty five or thirty (Lockwood, 1984: 68). However, other activities should not be carried in class of more than twenty-five or thirty pupils. Classes or groups in which activities designed primarily for social and emotional development are carried on, should undoubtedly be quite small, so that teachers in charge may become thoroughly familiar with each pupils, his needs, his personal qualities, and his problems (Steven 1994:52). Still others advocate that the nature of the subject, and the learning resources matter more than class size (Ayalew 1991: 120-121).

Research on group size in this aspects of education is not available, but common sense indicates that teachers can do more in helping individual boys and girls with their needs and problems if groups are held to twenty five or thirty rather than expanded to forty or fifty pupils.

2.7.1. Effect of Class Size on Instructional Programs

As stated above, large number of students in a class requires more time and energy of the teacher, and this may in turn affect the effectiveness of the teacher.

It is obvious that class size has a direct effect in the teaching and learning process. This means that class size has a direct bearing on the rate and number of communication between the teacher and the student which in turn has a direct effect on the desired outcome of the instruction. That is to say, large classes have adverse effect on instructional program whreas small class is favourable.

2.7.1.1. Effects of Large Class

The trend towards larger classes at secondary level adds to the heavy responsibility of the teacher who not only must teach but also aid pupils in adjusting from the elementary school to the secondary program, by integrating the previous learnings at primary schools with that of secondary level. Teachers at secondary level are also expected to provide a certain degree of remedial instruction in a variety of academic areas.

According to Gorton et al (1988: 58) teachers view that the quality of their teaching and their interaction with their students decline with an increase in the size of the class. Various studies emphasize the disadvantages of larger class size for both teachers and students. A study conducted by Bennett (1996: 4) indicates that as class size increases the volume of work in marking and preparation increases. Furthermore, Cololough and Keith (1993: 114) confirm that as class size increases, it would be very difficult in getting to know students.

According to Stinnett (1968:100) large class means more papers to correct, more records to keep, more seat work to plan more plans to make, and more individual differences to meet. Thus, large groups not only use up more nervous energy of the teacher, but require more time as well. It means that ,large class impedes the effectiveness of teaching learning process by creating a wide gap between the teacher and the students. According to Tozer, Violas and Senese (1993: 298), large class size leads to discipline problems, less involvement of students in classroom activities and little or no support to individual students.As a result of this, students may develop an atmosphere of disinterest in their learning because they don't know whether they did good or not.

The worse aspect of large class is its effect on students who are less able, who are quiet and introvert. Their problems may be overlooked or missed (Waxman and Walberg, 1991: 135).

Other educators also share the same point. Lingren and Suter (1985: 297) explain that large class size greatly harms students of low ability and those from lower socio-economic status. Such students need more help from teachers in order to cope academically up with other students. This implies that such class size problems are particularly serious in the natural science classes where more interaction, demonstration and experiment are needed of students. Providing assistance and involvement in practical and experimental activities of such students is possible only if the class size is manageable.

2.7.1.2 Benefits of optimum class size

Reduced class size is of highest importance particularly at secondary schools. Donald and Bernard (1955: 2) suggest as follows:

> *Individual pupils are apt to get more attention in small than in large classes and that the former provides a reasonable guarantee against educational accidents. Desirable classroom practices tend to be dropped when class size is increased and are added when class size is reduced.*

Emphasizing this point, Aseidu (1981:23) stated that in a good climate, students not only work well but they also enjoy the work and so benefit from what they are doing. Thus, classes consisting of optimum size are considered to create a favourable environment for the teacher as well as for students.

It is undeniable that the importance of providing intimate teacher pupil relationship facilitates a continuous development of pupils. This is possible when the teacher-pupil and pupil-classroom ratios keep their pace with the social demand on one hand and the expansions of schools are designed along with all necessary facilities on the other. School facilities should be available at such an extent that they fit to the active participation of each and every student in a classroom. This can take place only when fewer number of pupils are treated in a

classroom. Scholars like Blutter et al (1988: 118) also agree with this view by suggesting that "class size is particularly relevant, smaller classes with less than 24 pupils have a positive impact upon pupil progress and development."

Tozer, Violas and Senese (1993: 298) further explain the advantages of small class size. According to their view, in smaller classes interpersonal interactions are more, the condition which enables each students to get more attention both form the teacher and his/her classmates. Smaller classes are, therefore, warmer, friendlier and more satisfying than larger ones.

If class sizes are small, teachers will be able to closely supervise the progress of each student so that individual learners get more attention. Other writers like Lindgren and Suter identified the following advantages of small class:

- Both teachers and students get the opportunity of employing greater variety of educational materials, methods and activities.
- The climate of the classroom will be friendlier.
- Students volunteer more frequently to participate in learning-related activities.
- Teacher's behavior will be more relaxed and good-natured.

Small classes permit students to get better opportunity of being recognized by their teachers and hence receive necessary attention and support. Furthermore, both teachers and students get more opportunity of employing and utilizing educational materials, methods and activities. This is especially important in science teaching where each student is expected to learn through different methods such as demonstration, observation, experiment, measuring, etc. through the use of different equipment and apparatus.

2.7.2. Class Size in Different Countries

Class size can vary from country to country, from subject to subject, from teacher to teacher and from grade level to grade level. According to Frankish (1972: 17) the typical classrooms in America provide instructional space for 25 to 35 students and this class can be extended to contain 30 to 40 desks. What is implied here is that the class size can also be extended to a number of 40 which is said to be a crowded situation in their performance. This figure has similarity with the upper limit in France, too. According to his study (Frankish, 1972: 43-77), secondary schools in France accommodate 48 students as in England and while the classroom- students ratio in secondary schools of Japan is 37.4 Lynn (1988: 37) indicated that the class size in Japan crept to 55. This would be considered very large in the USA and all parts of Europe. The current standard set for Ethiopian secondary schools recommends a class size of 40 students in a room with a total area of 46.08m^2. But is not practical in our secondary schools and as many as 80 and more students are being crowded in a classroom whose area is mentioned above.

If class size maintained in our country is made practical, students have sufficient share to benefit from their teacher and have the chance to be engaged in all the facilities the school provides. The size of the class has great role in creating a conducive environment for the process of teaching and learning. Concerning this issue, Mills (1985: 88) says, "In most schools the majority of lessons take place in a classroom in which 30 or 50 pupils are engaged in a process of simultaneous learning."

Class size should be small if possible. Children progress at different pace, they need time and space with their teachers. Some need more attention than others do. "Larger class size makes

big difference to the learners: the students will feel as lost in the crowd unnoticed and for the teacher being available become more of a challenge" (Brown and Race 1995: 80).

In general, the optimum classroom-student ratio is the key factory for providing appropriate instructional opportunity. The larger the enrolment, the more difficult the teaching and learning programs will be.

CHAPTER THREE
ANALYSIS AND INTERPRETATION OF DATA

This chapter deals with the presentation and analysis of the data gathered from seven secondary school students, teachers and directors; and from seven woreda and zone education office supervisors.Two different tools were used to gather the data: a set questionnaire including both close and open-ended questions and an interview guide questions. From a total of 510 questionnaires distributed to students, 484 (94.9%), and of 70 distributed to teachers 62(88.6%) were properly filled and returned. Similarly, pre-prepared structured interview guide questions were presented for 31 directors and supervisors, among which 27 (87.1%) have correctly responded. The analysis of the data was based on the responses obtained from these groups of respondents.

TABLE 1: Characteristics of Students' Respondents

Sex				Age								Grades							
Male		Female		Less than 16 years		16-18 years		19-21 years		22 and above		9th		10th		11th		12th	
No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
305	63	179	37	38	7.9	403	83.3	28	5.8	15	3.1	79	16.3	110	22.7	130	26.9	165	34.1

As discussed in the introductory part of this chapter, a total of 484 students were involved in the study. As shown in table 1, 305 (63%) of the student respondents are male, while the remaining 179 (37%) of them are female. It then shows that female participation in secondary schools of the study area is by far less than that of the boys. Concerning the age of respondents, 38 (7.9%) of them are less than 16 years of age; 403 (83.3%) of the student respondents are in the age group of 16-18 and 28 (5.8%) are between the ages of 19-21. The rest 15 (3.1%) student respondents are 22 years of age and above. It can easily be concluded that the vast majority of the respondents are between the ages of 16 and 18.

Pertaining to educational level of student respondents, 79(16.3%) are grade nine and 110(22.7%) are grade ten students. Similarly, 130(26.9%) and 165(34.1%) are students of grade eleven and twelve respectively. The percentage of the respondents increases with grade level on the assumption that more reliable information is obtained from students of higher grades.

Table 2 Characteristics of Teachers respondents

Sex				Age								Education						Service					
Male		Female		> 2 1 years		21-30 years		31-40		41 & above		12TTI		12 +2		12+4		>11		11-20		<21	
N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
51	82.3	11	17.7	7	11.3	15	24.2	28	45.2	12	19.3	10	16.2	44	70.9	8	12.9	6	9.7	40	64.5	16	25.8

One can see from the above table that among the teachers involved in the study, 51(82.3%) are male while only (17.7%) are female teachers. This indicates that the ratio of female teachers in the secondary schools of the study area is quite low.

Concerning the age of the respondents 7(11.3%) are below 2 years. Fifteen (24.2%), 28(45.2%) and 12 (19.3%) are in the age range of 21-30, 31-40 and above 41 years respectively, with regard to the respondents age, 10(16.2%) and 44(70.9%) are TTI and TTC graduates respectively. It is only conclude that vast majority of the teachers teach beyond their level.

As to t6he service years of the teachers respondents, 6(9.7%) , 40(65.5%) and 16 (25.8%) have served below 11 years, 11-20 years 21 and above years respectively.

Table 3: Characteristics of Respondents

Directors and woreda and zone supervisors respondents by, sex , age, education and service

Respondents	Sex				Age								Education						Service					
	Male		Female		Below 21 years		21 –30 years		31-40 years		41 and above		12+TTI		12+2		12+4		Below 11 years		11-20 years		21 and 1bove	
	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%	N	%
Directors	12	100	-	-	1	8.3	4	33.3	4	33.3	3	25	-	-	5	41.7	7	58.3	4	33.3	6	50	2	16.7
Woreda supervisors	10	83.3	2	16.7	-	-	2	16.7	7	58.3	3	25	-	-	12	100	-	-	-	-	3	25	9	75
Zone supervisors	3	100	-	-	-	-	-	-	3	100	-	-	-	-	1	33.3	2	66.7	-	-	1	33.3	2	66.7
Total	25	92.6	2	7.4	1	3.7	6	22.2	14	51.9	6	22.2	-	-	18	66.7		33.3	4	14.8	10	37	13	48.1

As shown in Table 3, a total of 27 directors and supervisors took part in the study. Among these, 12 (44.4%) are directors while 15 (55.5%) are supervisors at zone and woreda level. As to their sex, 25 (92.6%) are male and the rest 2 (7.4%) of them are females.

With regard to respondents' age, the majority of them were within the age range of 31-40, which is 14 (51.9%). The rest 1 (3.7%), 6 (22.2%) and 6(22.2%) were in the age range of below 21, 21-30 and above 41 years respectively. This shows that the majority of the respondents are found in the adult age group. Concerning respondents' educational background, 18 (66.6%) are diploma holders . The remaining 9 (33.3%) are first degree holders. Regarding the service year of the respondents, 4 (14.8%), 10 (37%) and 13 (48.1%) served below eleven years, 11-20 years and above 21 years respectively.

Table 4:Teachers' Teaching Load

Less than 16		16-24 periods		25-30 periods		Above 30 periods		Total	
No	%	No	%	No	%	No	%	No	%
-	-	5	8.1	47	75.8	10	16.1	62	100

As to the teaching load, 47 (75.8%) of the teacher respondents teach 25 and above periods per week. Ten (16.1%) of them have more than 30 periods of teaching load weekly. Only 5(8.1%) of teacher respondents have 16-24 periods of teaching. From this one can conclude that most secondary schoolteachers in the study area are teaching 24 periods and above per week which implies that they have no spare time to provide additional assistance to students that need tutoring. The standard set for the provision of secondary education in Ethiopia states that the maximum teaching load is 25 periods per week (MoE,1995:23).

Table 5 Students' Responses Concerning Teachers' Qualification

No	Item	Responses	
		No	%
1	Are there teachers who teach you more than two subject?		
	• Yes	375	77.5
	• No	94	19.4
	• No response	15	3.1
	Total	484	100
2	If your response for question no. 1 is "Yes", how many of them teach you more than two subjects?		
	• ¼		
	• 1/3	296	78.9
	• 1/2	69	18.4
	• All of them	-	-
	• No response	-	-
		10	2.7
	Total	375	100
3	Are the teachers who teach you other than their major or minor subjects, able to manage the subjects without difficulty?		
	• Yes		
	• No	49	13.1
	• No response	320	85.3
		6	1.6
	Total	375	100
4	Is there considerable difference in your achievement between the subjects you are taught by qualified and unqualified teachers?		
	• My achievement is better in the subject(s) I am taught by qualified teachers.	367	75.8
	• There is insignificant difference between the two.	75	15.5
	• There is no any difference between them in achievement.	20	4.2
	• The achievement is reverse.	-	-
	• No response	22	4.5
	Total	484	100
5	What do you feel as a result of ineffective learning?		
	• It made me to hate the subject.	404	83.5
	• It made me to hate learning in general.	10	2.1
	• It motivated me to learn by myself.	-	-
	• It made me to hate both the subject(s) and the teacher(s).	63	13
	• No response	7	1.4
	Total	484	100
6	In addition to teaching effectively, what proportion of your teachers motivate students for better learning?		
	• All of them.		
	• Majority of them.	-	-
	• Few of them.	53	11
	• None of them.	383	79.1
	• No response	37	7.6
		11	2.3
	Total	484	100
7	Do all teachers maintain classroom discipline?		
	• Yes	130	26.9
	• No	339	70
	• No response	15	3.1
	Total	484	100
8	If your response for question no. 7 is "No", which teachers fail to maintain classroom discipline?		
	• Those who can teach effectively.	-	-
	• Those who can't teach effectively.	213	62.8
	• Teachers who lack professional ethics.	65	19.2
	• Teachers who are new to the profession.	51	15
	• No response	10	2.9
	Total	339	100

Table 5 shows students response concerning teachers' qualifications. As shown in item number 1 of the same table , an overwhelming majority of the respondents, (77.5%) replied that there are teachers who teach than two more subjects. Only a small minority of the respondents, (19.4%) reported that their teachers teach only one subject.

With regard to item number 2 of Table 5, (78.9%) of the respondent replied that ¼ of their teachers teach more than two subjects, i.e., other than their major and minor subjects. Furthermore, (18.4%) of the respondents reported that 1/3 of their teachers teach more than two subjects. Hence, it is possible to generalize from the response given that many of the teachers in the zone are teaching the subjects in which they do not have training the condition which leads to dissatisfaction to both groups- the teachers and the students.

As to item number 3 of the same table, an overwhelming majority, 4 (85.3%) of the respondents reported that those teachers who teach the subjects other than their training face difficulty in handling the subjects they teach. One can generalize from the response that the teachers cannot teach effectively the subjects other than their preparation. Furthermore, students benefit little from such teachers. As a result, the students are not able to prepare themselves well to be competent in their later lives.

Pertaining to item number 40 of the same table , the vast majority of the student respondents, (75.8%) showed that their achievement in the subjects taught by teachers who teach the subjects other than their training is not satisfactory. The remaining few respondents (15.5%) indicated that there is insignificant difference in their achievement in the subjects taught by qualified and

unqualified teachers. Therefore, it is possible to generalize that cognitive growth of the students doesn't progress uninterruptedly because of being taught by teachers who do not have the command of a specialized knowledge.

As revealed in item number 5 of Table 5, (83.5%) of the student respondents reported that they hate the subjects taught by unqualified teachers due to their ineffective teaching. Similarly,(13%) of them replied reported that the condition made them to develop hatred for the subjects as well as the teachers.

As it is depicted in item number 6 of the same table, majority of the respondents, (79.8%) indicated that few teachers motivate students in their learning in addition to teaching effectively. Only a small proportion of the respondents (11%) replied that majority of the teachers motivate students in addition to teaching effectively. From this it can be concluded that unqualified teachers are not only unable to teach effectively but also cannot motivate students for better learning.

As to item number 7 of Table 5, (70%) of the respondents reported that not all teachers who are able to maintain classroom discipline. Regarding the fact that what category of teachers fail to maintain classroom discipline, majority of the respondents, (60.8%) reported that those teachers who can't teach effectively do also have the problem of maintaining classroom discipline. Furthermore, (19.2%) and (15%) of the respondents reported that teachers who lack professional ethics and also those who are new to the profession fail to maintain classroom discipline. It is evident from the responses that teachers who are effective in teaching were not reported to fail to maintain classroom discipline. It is safe to generalize that unqualified and inexperienced teachers are ineffective both in teaching and in handling students so that they learn in a disciplined manner.

Thus, the overall picture of the data in the table reveals that well qualified and experienced teachers combine the best of human relations, knowledge of the subject matter and knowledge of how people learn. On the contrary, unqualified and unprepared teachers make circumstances very much complex so that the learning of the students is impeded.

Table 6Teachers' Responses Concerning Their Own Qualification

No	Item	Responses	
		No	%
1	In which subject do you have more teaching load?		
	• In my major subject	29	46.8
	• In my minor subject	20	32.2
	• In a subject I didn't have training	13	21
	• No response	-	-
	Total	62	100
2	If you are teaching the subject(s) in which you were not trained, don't you find it difficult to teach?		
	• Yes, I do.	12	92.3
	• No, I don't.	1	7.7
	• No response	-	-
	Total	13	100
3	Are you presently teaching the grade(s) for which you are qualified?		
	• Yes	12	19.4
	• No	48	77.4
	• No response	2	3.2
	Total	62	100
4	If you are teaching the grade(s) for which you are not qualified, what do you feel for teaching beyond your capacity?		
	• Less confidence in myself	18	29
	• Inability to fully manage the subject matter	23	37.1
	• Failure to maintain classroom discipline.	21	33.9
	• No response	-	-
	Total	62	100
5	Did you have secondary school teaching methodology courses?		
	• Yes	7	11.3
	• No	53	85.5
	• No response	2	3.2
	Total	62	100
6	If your response for question number 5 is "No", don't you find it difficult to properly handle both the class and the subject matter?		
	• Yes, I do.	49	92.4
	• No, I don't.	2	3.8
	• No response	2	3.8
	Total	53	100

Table 6 shows teachers responses concerning their own qualification. As can be seen in item number 1, (46.8%) and (32.2%) of the teacher respondents indicated that they have more teaching load in the major and minor subjects respectively. On the other hand, (21%) of the teachers replied that they have more teaching load in the subjects they didn't have training. In a similar way, the interviewed officials reported that many teachers are teaching the subjects other than their major or minor fields. For instance, geography teachers are made to teach English Language and civic education: productive technology teachers are made to teach physics. Furthermore, teachers of agriculture and home economics teach biology. This shows that about one-fifth of the teachers in the study area are teaching the subjects in which they were not qualified. Hence, they are not able to satisfy the academic interest and need of their students.

With regard to item number 2 of the same table, an overwhelming majority, (92.3%) of those that teach other subjects than their major or minor, reported that they find it difficult to teach the subjects. It is possible to generalize that where teachers fail to effectively manage the subjects they teach, students gain little or no cognitive development. Furthermore, teachers view their job as a source of frustration rather than of a joy.

As to item number 3 of Table 6, large majority of the teacher respondents (77.4%) reported that they are teaching the grade(s) for which they were not qualified. The remaining few 12(19.4%) responded that they are qualified for their positions. Hence, it is safe to conclude that most of the teachers in the zone are teaching beyond capacity. That means, large number of teachers graduated from teacher training institute and teacher training college are teaching in grades nine through twelve. The interview result indicated that nearly 11 percent and 70 percent of teachers who are

currently teaching in high schools are graduates of TTI's and TTC's. The standard set for education in Ethiopia states that the minimum required qualification to teach at secondary school level requires at least a first degree.

As it is depicted in item number 4 of the same of table, the respondents indicated their answers as follows what they feel as a result of teaching beyond their capacity. Eighteen (29%) replied that they lose confidence in themselves. Furthermore, (37.1%) reported that they fail to fully manage the subjects they teach. In a similar way (33.9%) of the respondents showed that they face difficulty in maintaining classroom discipline. The interview result indicated that teachers feel inadequate and hate their job as a result of teaching the subjects in which they are not qualified. Similarly students gain little knowledge from such teachers as a result, of which their performance declines. It is possible to generalize from the responses that there cannot exist good teaching and learning relationship in such a condition.

Item number 6 of Table 5 discloses that (85.5%) of the teacher respondents replied that they didn't have secondary school teaching method courses. Only (11.3%) of the respondents reported that they had. The number of teachers who are teaching without the how is so high. As a result it is possible for, these persons to misguide the students because they lack the skills, techniques and methods for helping students learn.

With regard to the last item of Table 6, the vast majority (92.4%) of the teachers who are teaching without the knowledge of the method reported that they face difficulty in properly handling both the class and the subjects. Thus, it is possible to generalize from the result of the responses that the goals of education cannot be achieved in the absence of the ability to guide human growth and development. In sum, teachers should be distinguished from other individuals who are also involved in the activities of children by their ability to guide human growth and development.

Table 7a: Responses Concerning Textbook Provision

No	Item	Responses			
		Students'		Teachers'	
		No	%	No	%
1	Is there shortage of textbooks in your school?				
	• Yes	341	70.5	42	67.7
	• No	138	28.5	18	29
	• No response	5	1	2	3.3
	Total	484	100	62	100
2	If your response for question no. 2 is "Yes", how many books didn't you get?				
	• one	127	37.2		
	• two	101	29.6		
	• three	85	24.9		
	• four	24	7.1		
	• five	-	-		
	• six and above	-	-		
	• No response	4	1.2		
	Total	341	100		
3	What is the pupil-book ratio of the textbooks you/the students obtained?				
	• 1:1	41	8.5	7	11.3
	• 1:2	95	19.6	10	16.1
	• 1:3	238	49.2	28	45.2
	• 1:4	94	19.4	16	25.8
	• 1:5	-	-	-	-
	• No response	16	3.3	1	1.6
	Total	484	100	62	100
4	If there is shortage of textbooks, how can you do/give different activities or take/give notes?				
	• By finding/ordering them to find/ books privately from whatever source.	175	36.1	20	31.8
	• By exchanging the few books I/they obtained with my /their friends.	242	50	35	56.8
	• I/They don't do them for lack of textbooks.	59	12.2	4	6.8
	• No response	8	1.7	3	4.5
	Total	484	100	62	100
5	As a result of shortage of textbooks, is instructional time wasted in your school?				
	• Yes	397	82	53	85.5
	• No	81	16.7	9	14.5
	• No response	6	1.2	-	-
	Total	484	100	62	100
6	If your response for question no. 5 is "Yes", what is the proportion of wasted time?				
	• Approximately ¼ of instructional time.	242	61	35	66
	• Approximately 1/3 of instructional time.	134	33.8	16	30.2
	• Approximately ½ of instructional time.	10	2.5	-	-
	• Approximately ¾ of instructional time.	-	-	-	-
	• No response	11	2.7	2	3.8
	Total	397	100	53	100

Table 7a shows the practice of textbook provision. Pertaining to item number 1 of the same table, (70.5%) of students and (67.7%)of teachers reported that there is shortage of textbook in their schools. A small minority of respondent (28.5%) of students and (29%) of teachers indicated in their response that there is no textbook shortage in their schools. Form this, one can understand that majority of the schools in the zone suffer the shortage. It is also possible to understand that the distribution of textbooks in the zone is not evenly. A chi-square was calculated to check if there were a significant difference between the responses given by students and teachers. Accordingly, the obtained value was 2.14: whereas the table value at 0.05 level of statistical significance is 5.991. It was, then concluded that there was no difference between the responses.

Item number 2 of Table 7a reveals that, (37.2%), (29.6%), (24.9%) and (7%) of students didn't obtain books in one, two, three and four subjects respectively. It will not be difficult to generalize from the response that quite large number of students are suffering the acute shortage of textbooks . It further indicates that teachers face great difficulty in trying to teach without books-the cheapest instructional material.

Concerning item number 3 of the same table, (19.6%), (49.2 %) and (19.4 %) of students and (16.1%) (45.2 %) and (22.6%) of teachers indicated that students obtained one book for two, three and four students respectively. In sum, (88.2%) of students and (87.1%) of teachers reported that such a proportion of students obtained textbooks contrary to the plan put in ESDP. The Second Education Sector Development program which lasts from 200/2003-2004/2005, states that, "About 4.37 million copies of textbooks shall be printed and distributed so that every students will be provided with essential textbooks,(MoE, 2000:27). A very small minority of respondents, (8.5%) of

students and (11.3%) of teachers replied that the ratio of the distributed books is1: 1.The interview held with directors and supervisors justified that because of high shortage, the pupil-book ratio in the zone is 1:3. It is possible, then, to conclude that students do not satisfactorily acquire the skills, attitudes and well defined scientific and historical truth they need to learn.

As it is depicted in item number 4 of Table 7a, (36.1%) of students and (31.8%) of teachers replied that students try to do different activities assigned by teachers by using the few copies reserved in the respective school libraries. Furthermore, (50%) of students and (56.8%) of teachers indicated that students do different assignments by sharing and exchanging across sections the few books they have obtained. In a similar way, (12.2%) of students and (6.8%) of teachers reported that students don't do homework and other assignments due to lack of textbooks. The response from the interview showed that the school keeps few copies of textbooks in the school libraries so that students will be able to do homework, take notes and do other assignments. Form this one can understand that lack of textbooks deter students form learning at their own paces. It further impedes the elaboration of the discussions and explanations given by teachers in the class rooms.

As can be seen from item number 5 of Table 7a, (82%) of students and (85.5%) of teachers responded that instructional time is wasted due to shortage of textbooks. On the other hand, (16.7%) of students and (14.5%) of teachers reported that no instructional time is wasted as a result. This is clearly a reflection of uneven distribution of the few textbooks available for use besides the high shortage. According to the calculated chi-square, the obtained result was 1.01 whereas the table value is 5.991 at 0.05 level of statistical significance. Hence, there is no difference between the responses obtained from both groups

Concerning the extent of the instructional time wasted due to shortage of textbooks, item number 6 of Table 6a, (61 %) and (33.8%) of students and (66%) and (30.2%) of teachers indicated in their responses that 1/4 and 1/3 of the time allotted for learning either pass without work or ineffectively used. Generally seen, 94.8% of students and 96.2% of teachers clearly stated that from ¼ to 1/3 of instructional time is wasted because of shortage of textbooks. The interview result supplemented that teachers fail to effectively utilize the periods allotted daily due to the fact that students do not have their own textbooks privately. This clearly shows that students are not appropriately using their instructional time and hence are not being prepared to successfully complete the education given for the level.

Table 7b: Responses Concerning Textbook Provision (Continued)

No	Items	Responses			
		Students'		Teachers'	
		No	%	No	%
1	Is there difference in your/in the students' achievement between the subjects in which you/they received textbooks and the ones you /they didn't?				
	• Yes	355	73.3	47	75.8
	• No	118	24.4	11	17.7
	• No response	11	2.3	4	6.5
	Total	484	100	62	100
2	If your response for question no.1 is "Yes", what is the extent of the difference?				
	• Considerable	213	60.0	30	63.8
	• Moderate	119	33.5	16	34.0
	• Insignificant	8	2.3	-	-
	• No response	15	4.2	1	2.2
	Total	355	100	47	100
3	Have the portions for the first semester been covered in all subjects? Have you covered your own portion?				
	• Yes	69	14.2	13	20.9
	• No	401	82.9	49	79.1
	• No response	14	2.9	-	-
	Total	484	100	62	100
4	If your response for question no. 3 is "No", how many subjects have not been covered within the given time?				
	• one	-	-		
	• two	36	9		
	• three	169	42.1		
	• four	184	45.9		
	• five and above	-	-		
	• No response	12	3		
	Total	401	100		
5	If your response for question no. 3 is "No", what do you think the reason(s) is/are?				
	• Shortage of text books	185	46.1	26	53.1
	• Voluminous of the textbooks	126	31.4	13	26.5
	• Wastage of instructional time due to different reasons	33	8.2	6	12.2
	• Due to using supplementary materials to the textbooks.	51	12.8	4	8.2
	• No response	6	1.5	-	-
	Total	401	100	49	100

With regard to item number 1 of Table 7b, a great majority of respondents, (73.3%) of students and (75.8%) of teachers replied that there is difference in students' achievement in the subjects in which they obtained textbooks and the ones they didn't. The remaining (24.4%) of students and (17.7%) of teachers showed in their response that there is no difference.

As to the magnitude of the difference in achievement, in item number 2 of Table 7b depicts that, (60.0 %) of students and (63.8%) of teachers reported that the difference is of a considerable size .The rest of the respondent, (33.5%) of students and (34%) of teachers replied that the difference is of moderate size. Furthermore, according to interview result obtained from directors and supervisors, the consequences of textbook shortage are more students repetition in a class, ever increasing drop-outers from the system and lack of interest to attend class regularly. Therefore, it is possible to generalize that shortage of textbooks is one of the major factors that act against effective learning of students, which in turn leads them to be unsuccessful to join successive learning or join the world of work.

Concerning item number 3 of Table 7b , the large majority of respondents, (82.9%) of students and (79.1%) of teachers reported that the portions planned for the first semester have not been covered within the time given. The rest few respondents, (14.2%) of students and (20.9%) of teachers replied that the portions for the semester have been completed within the given time. As calculated using the chi-square, the obtained value was 3.50. On the other hand, the table value at a significance level of 0.05 is 5.991. It is then, safe to say that there is no difference between the teacher' and the students' responses.

As revealed in item number 4 of the same table, (45.9%) of the student respondents reported that four subjects were not completed within the time given during the semester. Similarly, (42.1%) and (9%) of the students replied that three and two subjects respectively were not covered before the end of the semester. On the whole, (97%) of the respondents depicted that from two to four subjects allotted for the semester were not covered before the closure of the given time. Therefore, it is possible to generalize that about 25-40% of subjects are not completed within the time allotted for them. This indicates that students pass from one grade to the next without completing the portions allotted for the previous grade.

Concerning the last item of Table 7b, the reasons for failing to cover a given portion within the time allotted are scarcity of textbooks, voluminous of the textbooks , wastage of instructional time due to different reasons and using supplementary materials to textbooks. Among the factors listed above, the highest proportion goes to the shortage of textbooks. As indicated above, (46.1%) of student respondents and (53.2%) of teacher respondents reported that the major cause for failing to cover portions is shortage of textbooks. Thus, it is possible to generalize from the result of the responses that shortage of textbooks was found to be the major obstacle to instructional process in the secondary schools of the study area.

Table 8:Responses Concerning School Library Services

No	Item	Responses			
		Students'		Teachers'	
		No	%	No	%
1	Is there library service in your school?				
	• Yes	476	98.3	59	95.2
	• No	-	-	-	-
	• No response	8	1.7	3	4.8
	Total	484	100	62	100
2	If your response for question no 1 is "yes", how effective/satisfactory is the service it renders?				
	• Very high				
	• high	8	1.7	-	-
	• average	96	20.2	-	-
	• poor	242	50.8	29	49.2
	• No response	130	27.3	28	47.4
		-	-	2	3.4
	Total	476	100	59	100
3	Put in sequential order the following items in your library according to their quantity/ from highest to lowest quantity/.				
	• reference books	76	15.7	12	19.4
	• textbooks	117	24.2	25	40.3
	• periodicals and magazines	183	37.8	18	29.0
	• dictionaries	42	8.7	4	6.5
	• Encyclopedia	45	9.3	-	-
	• No response	21	4.3	3	4.8
	Total	484	100	62	100
4	How frequently do you/ your students utilize the library?				
	• Always	6	1.2	2	3.2
	• most of the time	17	3.5	4	6.5
	• sometimes	254	52.5	33	53.2
	• I/They don't utilize	201	41.5	22	35.5
	• No response	6	1.3	1	1.6
	Total	484	100	62	100
5	If your response for the above question is "sometimes" or "I /They don't utilize", why?				
	• No assignment is given to be done from the library.				
	• The library doesn't have relevant books.	24	5.2	-	-
	• The library is rarely open when needed.	121	26.6	25	45.5
	• Ignorance of library usage	260	57.0	23	41.8
	• No response	43	9.6	5	9.1
		7	1.6	2	3.6
	Total	455	100	55	100
6	Does your library borrow books for students?				
	• Yes	209	43.2	26	41.9
	• No	270	55.8	33	53.3
	• No response	5	1.0	3	4.8
	Total	484	100	62	100
7	If your response for question no. 6 is "No", what is the reason?				
	• The library doesn't have enough copies of reference books.	128	46.5	17	51.5
	• I /Students don't have the demand to read books.	-	-	-	-
	• Students/They don't know its importance.	4	1.5	3	9.1
	• There is no trained librarian in charge of the service.	135	49.1	12	36.4
	• No response	3	1.1	1	3.0
	Total	270	100	33	100

As can be seen from Table 8 of item 1 , almost all of the respondents, (98.3%) of the students and (95.2%) of the teachers indicated that there are school libraries in their respective schools.

Regarding item number 2 of the same table, (50.8%) and (27.3%) of students; and (49.2%) and (47.4 %) of the teachers responded that the service the libraries provide is average and poor respectively. Only (20.2%) of the students reported that the service they provide is high. Thus, it is possible to generalize from the result of the respondents that the school libraries are not providing the required degree of service.

As can be seen in item number 3 of Table 8, (40.3%) of teachers replied that textbooks are first in quantity in the school libraries. Reversely large proportion of students, (37.8%) asserted that it is periodicals and magazines that have biggest quantity. On the other hand, (24.2%) of students indicated that textbooks are available second to periodicals but (29%) of teachers replied that it is periodicals and magazines that are available next to textbooks. Similarly, both group of respondents, (15.7%) of students and (19.4%) of teachers reported that the availability of reference books stands third among the list. A few respondents, (8.7%) of students and (6.5%) of teachers; and (9.3%) of students and (4.8%) of teachers responded that dictionaries and encyclopedias are available respectively. According to the response obtained from the interviewee, the libraries in the secondary schools contain, from largest to smallest quantity, textbooks; periodicals and magazines; reference books, most of which are too old and less relevant to the curriculum on implementation. Therefore, it is possible to generalize that students can hardly get the opportunity of developing independent study in addition to what they learn in the classroom. Furthermore, teachers, especially the beginners, face difficulty in widening the lessons they prepare for class instruction.

As indicated in item number 4 of Table 8, the vast majority of respondents, (52.5%) and (41.5%) of the students; and (53.2%) and (35.5%) of the teachers reported that students utilize the school library sometimes and even do not utilize respectively. As to the reasons why the students do not utilize the libraries frequently, item number 5 of Table 7, gives the following points. Two hundred and seventy six (57%) and 129 (26.6%) of the students and (41.8%) and (45.5%) of teachers reported that the libraries do not provide satisfactory service,i.e., they are rarely open when needed and that the libraries do not have relevant books respectively. This asserts that existence of libraries is nominal for the reason that they rarely have little or no contribution to prepare students for independent learning after they will have completed the formal schooling.

As to item No 6 of Table 8, majority of respondents (55.8 %) of the students and (53.3 %) of the teachers replied that their school libraries do not borrow books to students. The remaining minority, 43.2 %of students and 41.9 % of the teachers replied that their school libraries borrow books to students. Thus, it can be understood from the responses obtained that schools do not provide the service uniformly for their students, i.e. some libraries borrow and others do not. In order to enable the secondary schools achieve their objectives, however, libraries should maximize the social utility of their documents.

Regarding the last item of Table 8, the overwhelming majority of the respondents, i.e., (46.5%) and (49.1%) of students and (51.5 %) and (36.4 %) of teachers replied that the reasons why their libraries do not borrow books to students are shortage of copies of reference books and the

unavailability of trained librarians respectively. This clearly shows that most of the school libraries in the zone are not equipped with necessary reading materials and trained librarians.

The overall picture of the data in the table show that the libraries in the secondary schools of the study area are not providing satisfactory service. It is obvious that a full-fledged library service is of paramount importance in developing reading habits and promoting self learning. Consequently, students will be able to give depth and width to the explanations given by teachers if the libraries are well organized and provide satisfactory service.

Table 9:Responses Concerning Science Education Provision

No	Item	Responses			
		Students'		Teachers'	
		No	%	No	%
1	Does your school have science laboratory?				
	• Yes	476	98.3	61	98.4
	• No	-	-	-	-
	• No response	8	1.7	1	1.6
	Total	484	100	62	100
2	If your response for question no 1 is "Yes", does it have enough chemicals and apparatus?				
	• It has sufficient chemicals and apparatus.	-	-	-	-
	• It has sufficient apparatus but insufficient chemicals.	241	50.6	5	8.2
	• It has sufficient chemicals but insufficient apparatus.	172	36.2	51	83.6
	• It has insufficient chemicals and apparatus.	63	13.2	5	8.2
	• No response	-	-	-	-
	Total	476	100	61	100
3	Does the laboratory have a trained technician?				
	• Yes	67	13.8	9	14.5
	• No	404	83.5	53	85.5
	• No response	13	2.7	-	-
	Total	484	100	62	100
4	If your response for the above question is "No", how does the laboratory function?				
	• By the concerned subject teachers.	62	15.4	8	15.1
	• By a person without training	68	16.8	8	15.1
	• It doesn't function	270	66.8	37	69.8
	• Others	-	-	-	-
	• No response	4	1	-	-
	Total	335	100	53	100
5	If your response for question no. 4 is "It doesn't function " how are you able to learn/teach science education?				
	• Through explanations	268	99.3	35	94.6
	• Through the use of science kit materials.	-	-	-	-
	• others	-	-	-	-
	• No response	2	0.7	2	5.4
	Total	270	100	37	100

Table 9 shows students' and teachers' responses concerning science education provision. Item number 1 of the same table, shows the availability of science laboratory in the schools under study. Accordingly, (98.3%) of students and (98.4%) of teacher respondents unanimously showed that there are science laboratories in their schools.

With regard to item number 2 of Table 9, (50.6%) of students and (8.2%) of teachers replied that the laboratories have sufficient apparatus but insufficient chemicals. On the contrary, (36.2%) of students and (83.3%) of the teachers reported that the science laboratories have sufficient chemicals but insufficient apparatus. Due to the teachers' experience and better knowledge than that of the students, it is logical to favor the response given by teachers that the laboratories have sufficient chemicals but insufficient apparatus. The interviewee respondents also reported that there is no shortage of chemicals at present but the shortage of the apparatus is serious. One can see from this that even though the school laboratories have sufficient chemicals, they have no sufficient apparatus. The availability of one is nearly of little use without the other, hence it hinders the liveliness of science education.

Pertaining to item number 3 of Table 9, the vast majority of the respondents, (83.5%) of the students and (85.5%) of the teachers indicated that there are no trained laboratory technicians in their schools. The remaining few of the respondents (13.8%) of the students and (14.5%) of the teachers replied that their schools have trained laboratory technicians. The result of the interview made clear that one out of seven schools has a trained laboratory technician. Thus, it is possible to generalize from the result of the responses that majority of school science laboratories do not have trained technicians.

Item number 4 of the same table shows that, (15.4%) of the students and (15.1%) of the teachers responded that the science laboratories function by concerned subject teachers. And (16.8%) of the students and (15.1%) of the teacher respondents reported that the laboratories are manipulated by untrained persons. On the other hand, a large majority of the respondents, (66.8%) of the students and (69.8%) of the teachers reported that their school laboratories do not function at all. According to the responses obtained from the interviewee, only one of the seven secondary schools has a trained laboratory technician; and the other six schools do not have. Among these, four are non-functional; one is manipulated by untrained person who was given a few day's orientation and still the remaining one science laboratory operates occasionally by respective subject teachers. Therefore, it is possible to conclude that in both cases, the students are not provided with satisfactory science laboratory service.

The last item of Table 9, discloses that (99.3%) of the students and (94.6%) of the teachers reported that science education is provided through oral explanation of teachers. This clearly shows that the teaching of science education in the study area is unsatisfactory because learning science involves giving students the opportunity to find and discover the relationship between an among facts, materials and events.

The total picture of the data in the above table clearly reveal that the schools in the study area have all science laboratory. However, their contribution to the teaching of science is quite unsatisfactory. This is because on one hand they lack the necessary apparatus and equipment and on the other hand, they so not have trained technicians. In sum, if science teaching is needed to bring forth a desired effect, it has to be supported by experiment observation, demonstration and field trips along with discussions and explanations given by teachers.

Table 10:Students' Responses Concerning Class Size

No	Item	Responses	
		No	%
1	How frequently do you do the homework and other activities given by teachers?		
	• I do all the time.	218	45
	• I do most of the time.	192	39.7
	• I do sometimes.	56	11.6
	• I never do .	18	3.7
	• No response	-	-
	Total	484	100
2	If your response for question no. 1is not "I do all the time" why?		
	• Teachers rarely check students' work.	136	51.1
	• I don't have textbook.	110	41.3
	• I don't have time.	6	2.3
	• I don't understand the lesson.	6	2.3
	• No response	8	3
	Total	266	100
3	How do your teachers check homework and class work ?		
	• By getting students exchange their exercise books.	204	42.2
	• By getting students check their own exercise books.	92	19
	• They check themselves.	86	17.8
	• They never check.	102	21
	• No response	-	-
	Total	484	100
4	If teachers do not check the students' work by themselves, why?		
	• The number of students is very large in the class.	361	90.7
	• Students are negligent.	6	1.5
	• Teachers are not responsible.	10	2.5
	• Others	9	2.3
	• No response	12	3.0
	Total	398	100
5	Does each student readily get appropriate academic support from his/her teachers?		
	• Yes	25	5.2
	• No		93.6
	• No response	453	1.2
		6	
	Total	484	100
6	If you response for question no. 5 is "No", what do you think the reason(s) is/are?		
	• Too many students in a class	255	56.3
	• Both students and teachers have rarely enough time.	86	19.0
	• Teachers are not willing to help students.	56	12.4
	• Students do not seek assistance.	35	7.7
	• No response	21	4.6
	Total	453	100

As shown in item number 1 of Table 10, only (45%) of students frequently do the homework and other activities they are given by teachers. The majority, (51.2%) of students do their assignments most of the time and also sometimes respectively.

Regarding item number 2 of the same table, (51.1%) of respondents pointed out that they do not frequently do the different activities they are assigned by teachers because the teachers rarely check the students' work. Furthermore, large number of the student respondents (41.3%) reported that they do not frequently do homework and other activities because they do not have enough textbooks. It is, therefore, possible to conclude that teachers' failure to cheek students' work is a major impediment to continuous learning of the students.

As can be seen from item number 3 of Table 10, (61.2%) of the students replied that teachers check students' work either by making students exchange their exercise books or by making a student check his/her own work. A very small minority of respondents, (17.8%) of students replied that teachers check students work themselves. Furthermore, (21%) of the respondents reported that teachers never check students' work at all. Hence, it is clear to conclude that students learn little without close and day- to- day follow-up of teachers.

Pertaining to item number 4 of Table 10, an overwhelming (90.7%) of the students reported that the reason(s) why teachers do not check students work themselves is that the number of students is very large in a class. This clearly shows that individual students do not get the required follow-up and appropriate assistance, which enables them to sustain their academic progress.

Item number 5 of the same table portrays that the overwhelming majority of respondents, (93.6) of students replied that students do not get appropriate academic support from their teachers. One can see from the response of the students that they do not get enough attention and support they need from their teachers. As a result, their desire to learn is affected.

Concerning the reason(s) why teachers do not provide necessary academic support for each student, the majority of respondents (56.3%) reported that the number of students in a class is too large. The remaining few of the respondents (19%), (12.4%) and (7.7%) of the students replied that both students and teachers have rarely enough time; teachers are not willing to help students; and students do not seek assistance respectively. Hence, it is possible to generalize from the responses of the students that large class size adversely affects the smooth functioning of the teaching and learning process.

As to the open-ended questions which says what problems does large class (too many students in a class) create on the teaching-learning process, most of the interviewee outlined the following points:

A. It makes difficult for the teachers to help individual students.

B. It is difficult for the teacher to give and check different activities.

C. It forces teachers to use only lecture method, which makes the students passive Participants.

D. Teachers fail to implement continuous assessment.

E. It makes difficult for the teacher to maintain classroom discipline.

F. It minimizes the academic achievement of students.

G. It consumes much of teacher's energy.

H. It deteriorates the quality of education.

Table 11:Teachers' Responses Concerning Class Size

No	Item	Responses	
		No	%
1	How frequently do you check and follow up your students doing their homework,classwork, taking notes and doing other assignments?		
	• Always.	2	3.2
	• Sometimes	30	48.4
	• rarely	25	40.3
	• Not at all	4	6.5
	• No response	1	1.6
	Total	62	100
2	If you do not check the students' work always, what is/are your reasons(s)?		
	• The number of students is very large in class.	42	71.2
	• Students are negligent.	3	5.1
	• I have rarely enough time because of overload work.	14	23.7
	• Others	-	-
	• No response	-	-
	Total	59	100
3	Do you try give appropriate academic support for the needy students?		
	• Yes	8	12.9
	• No	51	82.3
	• No response	3	4.8
	Total	62	100
4	If your response for question no. 3 is "No", what is/are your reason(s) ?		
	• Too many students in a class	48	94.1
	• Both students and teachers have rarely enough time.	3	5.9
	• Students don't need support.	-	-
	• No response	-	-
	Total	51	100

Table 11, shows teachers' responses concerning class size in secondary schools. As shown in item number 1, (48.4%) and (40.3%) of the teachers replied that they check students' activities sometimes and rarely respectively. On the whole, (88.7%) of the teachers reported that they do not regularly check and follow-up the students work. Furthermore, (6.5%) of the respondents indicated that they do not follow-up at all. It is possible to generalize from the result of the responses that students won't have confidence in their progress because of the fact that their teachers provide them little or no academic feedback as to their performance.

As indicated in item number 2 of the same table, an overwhelming majority of the respondents (71.2%) indicated that they are unable to check and follow-up the activities of their students because the number of students is very large in a class. Only a small minority, (5.1%) of the respondents replied that they have rarely enough time due to overload of work. Hence, it is clear that undesirable class size deters teachers from closely following students' performance and providing remedial instruction in the areas of difficulty to students learning.

As it is depicted in item number 3 of Table 11, an overwhelming majority of respondents (82.3%) replied that they do not give necessary academic support to needy students. In item number 4 of the same table, (94.1%) of the respondents reported that that they are unable to give necessary academic support to needy students because there are too many students in a class. Thus, it is possible to generalize that large class size spoils intimate teacher-pupil relationship which facilitates a continuous development of students. Hence, it will be impossible for the teacher to identify his students according to their ability so that he/she will be able to provide appropriate academic support for those that need additional assistance.

CHAPTER FOUR

Summary, Conclusions and Recommendation

4.1 Summary

The main purpose of this study was to examine the problems and prospects of secondary education provision in West Wollega Zone by identifying the major obstacles that hinder the quality provision of the program and then to come up with some solutions that ought to be put into practice to alleviate the problems. To this end, the following basic questions were raised.

1. What proportion of the teachers in the study area is qualified for the subjects and grades they are teaching?
2. What does the provision of textbooks look like?
3. Are the school libraries sufficiently equipped with necessary documents to enable the schools achieve their objectives?
4. How much satisfactory is the provision of science education?
5. What are the effects of large class on instructional programs?
6. What solutions should be proposed to alleviate the problems?

The study was carried out in seven government secondary schools. Besides, supervisors from the zone, and from seven woredas in which the high schools are found, the directors in each of the sample schools, the teachers and students were taken as the subject of the study.

In addition to the information obtained from the sample respondents through a set of questionnaires and structured interviews, different documents prepared by Ministry of Education were consulted to make clear the class size of the schools in the study, the teaching load of teachers, the quality and quality of different inputs necessary for the effective provision of the education.

Percentages and chi-square were used for the analysis of the data collected. Based on the results of the analyzed data, the forth-coming major findings were obtained.

1. Teachers are inadequate both in number and qualification. Some of them are obliged to teach two or more subjects, even out of their major or minor areas. Furthermore, majority of them are teaching the grades for which they were not qualified. As a result, these teachers. Furthermore, about 21 percent of he teachers teach the subjects other than their major or minor areas. About 87 percent of them teach beyond their level, i.e. being diploma and certificate holders, they teach grades nine through twelve. It is only 13 percent of the teachers that are fit for he grades they are teaching.

2. In most of the secondary schools there is acute shortage of textbooks.

   Consequently,

   a) The average textbook-pupil ratio is 1:3 in most of the schools.
   b) Students are forced to share the few books they obtained across sections to do different assignments and take notes.
   c) Approximately from ¼ to 1/3 of instructional time is wasted for lack of textbooks.
   d) There is considerable difference in student's achievement among subjects in which the students obtained textbooks and not.
   e) Portions fail to be covered within the given academic calendar.
   f) This resulted in more student repetition in a class, ever increasing drop-outers and lack of interest in attending classes.

3. The academic libraries in the secondary schools do not render satisfactory service both to students and teachers. Hence,

   a) they contain dominantly textbooks and periodical, but the few available reference book are both old and les relevant the curriculum being implemented;
   b) The libraries are rarely open when the students want to utilize them;
   c) They do not borrow reference books for students to use them at home;

d) The libraries do not have trained librarians;

4. The provision of science education is unsatisfactory because even though all the secondary schools have enough chemicals they do not have apparatus.

    a) Only one out of seven laboratories (14.3%) have trained technician;

    b) A few laboratories are manipulated by subject teachers and untrained teachers drawn from elementary schools;

    c) In most of the schools, science teaching is dominantly theoretical based on teachers' explanations;

5. The number of students in a class is more than 81 in all schools. As a result of this,

    a) Teachers cannot regularly give homework, class work and other activates and check by themselves.

    b) Teachers are forced to make students exchange their exercise books to check their work.

    c) Teachers cannot identify students according to their ability to give them appropriate academic support-no intimate relationship between teachers and students.

    d) The inability of students to get necessary academic support made most of them to unenthusiastically attend classes.

    e) Teacher are forced to use only lecture method of teaching As a result, students become passive participants and much of teachers energy is used us.

    f) Teacher could not implement continuous assessment

    g) Teachers fail to maintain classroom discipline

4.2 Conclusions

Based on the major findings of the study, the following conclusion is drawn:

The under-qualified and non-qualified teachers can hardly satisfy the academic thirst of their students. As a result, students do not get the required cognitive development and their achievement in the subjects taught by such teachers will be unsatisfactory. Such inadequacy on the part of the teaching personnel is one of the causes for grade repetition, lack of interest to learn and increased dropping out of students from the system.

In a similar way, such teachers feel inadequate and lack confidence for failing to carry out their duties effectively. This is because they lack the command of specialized knowledge. Since this phenomenon can be the cause for undesirable classroom discipline, such teachers view their job as a source of frustration rather than of joy.

Shortage of textbooks acted against effective learning of students. This was so because it impeded the elaboration of the contents taught by teachers in the classrooms at their leisure time. As a result, the cognitive development of students couldn't be sustainable due to the fact that they lack these written permanent materials readily at hand. Furthermore, students pass from lower grades to higher ones without fully acquiring the skills, attitudes and well-defined scientific and historical truth contained in their textbooks.

Shortage of textbooks also creates unfavorable condition to the work of teachers. Teachers become helpless because they do not and cannot know everything to teach effectively without the textbooks. Moreover, the shortage adds to the heavy duty of teachers in that they are obliged to give notes and write exercises on blackboards.

All the libraries were found that they do not adequately serve the needs of their respective schools in preparing students for life. The fact that they are all not well-stocked and also lack trained librarians was found to make the service unsatisfactory. Hence, students fail to develop reading habit which is the basis for independent study or self-learning that continues after they will have completed formal schooling. Furthermore, since what students learn in classrooms cannot be exhaustive, they leave schools without being equipped with adequate knowledge.

Due to unsatisfactory organization of the school science laboratories, students were forced to learn the result of science rather than the process of science. Not all scientific concepts and ideas are agreed upon by all scientists, i.e. some are open for further investigation. On the contrary, learning scientific process enables students to discover the relationship between and among facts, materials and events. As a result, students will be able to put things in their own way and come up with their own conclusions and generalizations.

In undesirable class size, students will have little involvement in the classroom activities. They also receive little or no support from their teachers. As a result, they may develop an atmosphere of disinterest in their learning because they do not know whether they did well or not as long as their teachers cannot give them regular follow-up and feedback. Hence, low ability and introvert students are lost in the crowd.

The effect of large class has also a negative influence on the teachers. It uses up more nervous energy of them and also consumes more of their time. Teachers are forced to correct more papers, to keep more records, to prepare more teaching plans and to meet more individual differences. The cumulative effect would be the feeling of boredom and lack of motivation to teach enthusiastically.

4.3 Recommendations

In view of the findings of the study and the conclusions drawn, the following recommendations are forwarded.

1. The finding of the study showed that there is an acute shortage of qualified teachers in all the secondary schools. The problem could be minimized and finally eliminated as suggested below;

   a. The Ministry of Education need to widen the scope of the in-service summer training provided for secondary school teachers.

   b. The Ministry need to empower the regional colleges to train teachers in a degree program.

   c. The existing teachers of the level need to be provided with other aids that supplement the materials they have at hand for teaching.

   d. A refreshment program need to bc prepared for qualified but long served teachers.

2. Textbooks are found to be highly scarce in the secondary schools. This problem should be attacked by concerned bodies as suggested below:

   a. The ministry of Education and the OREB should jointly work to produce enough copies of textbooks; the printing of the text materials need to be on quality paper so that textbooks will have longer years of service.

   b. Textbooks should be available for sale for that student who can afford to buy so that the scarcity would be minimized.

   c. ZED and WEO's need to coordinate the community and aid agencies to obtain fund that would enable them to print more textbooks by getting permission of copy right.

3. The service that school libraries provide was found to be far less inadequate that they rarely support the provision of education at the level. Thus,

   a. A regular budget need to be allocated for the purchase of reference books every year from the block grant allowed for woreda education offices.

   b. The Ministry of Education needs to aim at training more librarians in order to enable the secondary schools to have at least one.

   c. The respective school administrations need to devise a system

      i. to make the school libraries open the whole day long

      ii. for student to get library documents borrowed.

4. The contribution of the school laboratories to the instructional programs in the secondary schools was discovered to be insignificant. In order to tackle the problem and make the laboratories supportive to the program,

   a. The Minatory of Education should be able to seek ways for providing laboratory apparatus and equipment.

   b. The training of laboratory technicians should be resumed.

   c. Science laboratory operation course need to be incorporated in the education of science teachers while they are in higher learning institutions so that the teachers make the laboratories functional when there is no technician in the school.

5. Since it was discovered that undesirable class size is one of the major obstacles to quality provision of education, different stalk holders should play their part to alleviate the problem. Accordingly,

   a. The Ministry of Education should design a system to train teachers the methods and techniques that enable them to handle larger classes.

b. The Ministry and the Regina Education Bureau have to seek ways to provide visual and audio material that supports teachers who deal with larger classes.

c. The REB should plan to build one secondary school in each woreda.

d. The REB and the ZED need to allow additional payment for teachers who teach the classes beyond the national standard.

e. The local authorities have to coordinate the community to build more classes.

f. School administrators need to allocate capable teachers in the classes of larger size.

6. At present, no secondary school in the study area has animation group that organizes the science laboratories. Therefore,

a. The ZED and REB should make every effort to establish at least one group and provide the desired training so that the group moves through the secondary schools and organizes the secondary school laboratories

BIBLIOGRAPHY

1. Books

Allan, Margaret. (1972). The School Library Resource Centre. London: Crosby Lockwood Staples.

Aseidu, Akrofi K. (1981). The Living Classroom. Great Britain: George Alten and Unwin Publishers Ltd.

Baez, Albert V. (1976). Innovation in Science Education. Belgium. UNESCO Press.

Barrass, Robert (1982). Modern Biology Made Simple. London: The Chaucer Press Ltd.

Blutter, J. Heyneman, Allan B. Craig and Michael N.T. (1988). Science and Development. London Macmillan.

Brown, S. and Race, P. (1995). Assess your own Teaching Quality. London: Kogan page Ltd.

Brubacher James R. (1996). Field Experiences in Secondary Education. New York: Prentice Hall.

Callahan, Joseph F. and Leonard H. Clark (1988). Teaching in the Middle and Secondary Schools 3rd ed. New York: Macmillan Publishing Company.

Carrone, L Kallose. (1996). Quality Teacher Education. New York: Macmillan.

Clark Leonard H. and Irving S. Starr (1986). Secondary and Middle Secondary Teaching Methods 5th ed. USA: Macmillan Publishing Company.

Clark, Leonard H. (1986). Secondary and Middle School Teaching Methods, 6th edition. New York: MACMILLAN publishing company.

Cololough, C. and L. Keith (1993). Educating all Children for Primary Education in the South. Oxford: Clarendon Press.

Dean, J. (1972). Planning Library Education Program. Great Britain: Ebenezer Baylis and Sons Ltd.

APPENDICES

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF EDUCATION

DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

RESEARCH QUESTIONNAIRE

To be filled by secondary school teachers.

The main objective of this questionnaire is to collect necessary information for the study on ***"problems and prospects of secondary Education provision in West Wellega Zone".*** And to identify major problems hindering the quality provision of education at this level and to come up with some solutions that need to be designed for better provision. You are therefore, kindly requested to fill in the questionnaire because the success of this study directly depends upon your genuine responses to the questions.

Thank you for your cooperation in advance.

INSTRUCTION

1. No need of writing your name.
2. Put an "X" mark in the space provided for your answers.
3. Give short answers in the space provided for question items that are open-ended.

PERSONAL INFORMATION

Place of work

Woreda_____ Town_____

Name of your school _____

1. Sex a) Male ☐ b) Female ☐
2. Age a) Below 23 years ☐ d) 37-45 years ☐
   b) 24-28 years ☐ e) Above 46 years ☐

c) 29-36 years ☐

3. Qualification

a) Grade 12 complete ☐ d) 12+2 ☐

b) Graduated from TTI ☐ e) 12+3 ☐

c) 12+1 ☐ f) 12+4 ☐

g) Other (specify) if there is any_____

4. What is your responsibility in the school?

a) Director ☐ c) Teacher ☐

b) Assistant Director ☐ d) Unit Leader ☐

5. Your experience in the field of education as educational administrator and teacher.

a) 1-5 years ☐ d) 16-20 years ☐

b) 6-10 years ☐ e) 21-25 years ☐

c) 11-15 years ☐ f) 26 and above ☐

6. Your experience in the field of education as a teacher.

a) 1-3 years ☐ d) 11-15 years ☐

b) 4-6 years ☐ e) 16-20 years ☐

c) 7-10 years ☐ f) 21 and above ☐

7. Your experience in the field of education as educational administrator.

a) 1-5 years ☐ d) 16-20 years ☐

b) 6-10 years ☐ e) 21-25 years ☐

c) 11-15 years ☐ f) 26 and above ☐

TEACHERS' QUALIFICATION

1. What is your filed of specialization?

a) Major _____

b) Minor_____

c) Other(s) _____

2. Which grade level are you currently teaching?

a) Grade 9 ☐ b) Grade 10 ☐ c) Both grades ☐

3. What is your weekly teaching load?

a) Less than 15 periods ☐ c) 25-30 periods ☐

b) 16-24 periods ☐ d) More than 30 periods ☐

4 In which subject do you have more teaching load?

a) In my major subject ☐

b) In my minor subject ☐

c) In a subject I didn't have training ☐

5 If you are teaching the subject in which you were not trained, don't you find it difficult?

a) Yes, I do ☐ b) No, I don't ☐

6. Are you presently teaching the grade(s) for which you are qualified?

a) Yes ☐ b) No ☐

7 If you are teaching the grades and subjects for which you are not qualified, what do you feel for teaching beyond your capacity?

A Less confidence in myself. ☐

B Inability to fully manage the subject matter. ☐

C Failure to maintain classroon discipline. ☐

8 .Did you have secondary school teaching methodology course?

a) Yes ☐ b) No ☐

9. If your response for question No.8 is "NO", don't you find if difficult to properly handle the class? (please give reasons for your response).

a) Yes, I do ☐ _____

B) No, I don't ☐ _____

TEXTBOOKS SUPPLIES

10/ Is there shortage of textbooks in your school?

A/ Yes ☐

B/ No ☐

11/ What is the pupil-book ratio of the textbooks your students obtained?

A/ 1:1 ☐

B/ 1:2 ☐

C/ 1:3 ☐

D/ 1:4 ☐

E/ 1:5 ☐

12/ If there is shortage of textbooks, how can your steudents do different activities or take notes?

A/ By finding books privately from whatever source. ☐

B/ By exchanging the few books they obtained with their friends. ☐

C/ They don't do them for lack of textbooks. ☐

D/ No exercise is given by teachers. ☐

13/ As a result of shortage of textbooks, is instructional time wasted?

A/ Yes ☐ B/ No ☐

14/ If your response for question no 13 is "Yes", what is the proportion of wasted time?

A/ Approximately ¼ of instructional time.

B/ Approximately 1/3 of instructional time. ☐

C/ Approximately ½ of instructional time. ☐

D/ Approximately ¾ of instructional time. ☐

15/ Is there difference in your achievement between the subjects your student received textbooks and the ones they didn't?

A/ Yes ☐ B/ No ☐

16/ If your response for question no. 15 is "Yes", what is the extent of the difference?

A/ considerable ☐

B/ moderate ☐

C/ insignificant ☐

17/ Have the portions for the first semester been covered in all subjects?

A/ Yes ☐

B/ No ☐

18/ If your response for question no. 17 is "No", how many subjects have not been covered within the given time ?

A/ one ☐

B/ two ☐

C/ three ☐

D/ four ☐

E/ five and above ☐

19/ If your response for question no. 18 is "No", what do you think the reason(s) is/are?

A/ Shortage of text books ☐

B/ Voluminous of the textbooks ☐

C/ Wastage of instructional time due to different reasons ☐

D/ Due to using supplementary materials to the textbooks ☐

SCHOOL LIBRARY SERVICE

20/ Is there library service in your school?

A/ Yes ☐

B/ No ☐

21/ If your response for question no 20 is "yes", how effective/satisfactory is the service it renders?

A/ Very high ☐

B/ high ☐

C/ average ☐

D/ below average ☐

22/ Put in sequential order the following items in your library according to their quantity.

A/ reference books ☐

B/ textbooks ☐

C/periodicals and magazines ☐

D/ dictionaries ☐

E/ encyclopedia ☐

23/ How frequently do your students utilize the library?

A/ Always ☐

B/ most of the time ☐

C/ sometimes ☐

D/ I don't utilize ☐

24/ If your response for the above question is "C", or "D" why?

A/ No assignment is given to be done from the library. ☐

B/ The library doesn't have relevant books. ☐

C/ The library is rarely open when needed. ☐

D/ I don't know how to use the library. ☐

25/ Does your library borrow books for students?

A/Yes ☐ B/ No ☐

26/ If your response for question no. 25 is "No", what is the reason?

A/ The library doesn't have enough copies of reference books. ☐

B/ Students don't have the demand to read books. ☐

C/ I don't know its importance. ☐

D/ There is no trained librarian in charge of the service ☐

SCIENCE EDUCATION PROVISION

27 / Does your school have science laboratory?

A/ Yes ☐ B/ No ☐

28/ If your response for question no 27 is "Yes", does it have enough chemicals and apparatus?

A/ It has sufficient chemicals and apparatus. ☐

B/ It has sufficient apparatus. but insufficient chemicals. ☐

C/ It has sufficient chemicals but insufficient apparatus. ☐

D/ It has insufficient chemicals and apparatus. ☐

29/ Does the laboratory have a trained technician?

A/ Yes ☐ B/ No ☐

30/ If your response for the above question is "No", how can the library function?

A/ By the concerned subject teacher. ☐ C/ It doesn't function ☐

B/ By a person without training ☐ D/ others ☐

31/ If your response for question no. 30 is "D", how are you able to learn science education?

A/ Only through explanations given by teachers. ☐

B/ Through the use of science kit materials. ☐ C/ others ☐

CLASS SIZE

32/ How frequently do you chek and follow-up your students doing their homework, classwork, taking notes and doing other assignments?

A/ Always. ☐

B/ Sometimes. ☐

C/ Rarely. ☐

D/ Not at all ☐

33/ If you do not check and follow-up the students' work always, what is/are your reasons?

A/ The number of students is very large in a class . ☐

B/ Students are negligent. ☐

C/I have rearely enough time because of overload work. ☐

D/ others _____

34/ Do you give appropriate academic support fot tne needy students?

A/ Yes ☐

B/ No ☐

35/ If you response for question no.42 is "No" what is/are your reason(s) ?

A/ Too many students in a class ☐

B/ Both students and teachers have rarely enough time. ☐

.C/ Students do not need support. ☐

D/ Others_____

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF EDUCATION

DEPARTMENT OF EDUCATIONAL PLANNING AND MANAGEMENT

RESEARCH QUESTIONNAIRE

To be filled by secondary school Students.

The main objective of this questionnaire is to collect necessary information for the study on ***"problems and prospects of secondary Education provision in West Wellega Zone".*** And to identify major problems hindering the quality provision of education at this level and to come up with some solutions that need to be designed for better provision. You are therefore, kindly requested to fill in the questionnaire because the success of this study directly depends upon your genuine responses to the questions.

Thank you for your cooperation in advance.

INSTRUCTION

4. No need of writing your name.
5. Put an "X" mark in the space provided for your answers.
6. Give short answers in the space provided for question items that are open-ended.

PERSONAL INFORMATION

Woreda_____ Town_____

Name of your school _____

1. Sex a) Male b) Female ☐
2. Age a) Below 16 years ☐ d) 22 and above ☐

b) 16-18 years ☐

c) 19-22 years ☐

3 Grade

a) 9th ☐ c 11th ☐

b) 10th ☐ d 12th ☐

TEACHERS' QUALIFICATION

1. Are there teachers who teach you more than two subjects?

   A/ Yes ☐ B/ No ☐

2. If your response for question no. 1 is "Yes", how many of them teach you more than two subjects?

   A/ 1/4 ☐ C/ 1/2 ☐

   B/ 1/3 ☐ D/ All of them ☐

3. Are the teachers who teach you other than their major or minor subjects able to manage the different subjects without difficulty? ☐

   A/ Yes ☐ B/ No

4/ Is there considerable difference in your achievement between the subjects you are taught by qualified and unqualified teachers?

   A/ My achievement is better in the subject(s) I am taught by qualified teachers . ☐

   B/ There is insignificant difference between the two. ☐

   C/ There is no any difference between them in achievement. ☐

   D/ The achievement is reverse. ☐

5. What do you feel as a result of ineffective learning?

   A/ It made me to hate the subject. ☐

   B. It made me to hate learning in general. ☐

   C/ It motivated me to learn by myself. ☐

   D. It made me to hate both the subject(s) and the teacher(s). ☐

6/ In addition to teaching effectively, what proportion of your teachers motivate students for better learning?

A/ All of them. ☐

B/ Majority of them. ☐

C/ Few of them. ☐

D/ None of them. ☐

7/ Do all teachers maintain classroom discipline?

A/ Yes ☐

B/ No ☐

8/ If your response for question no. 7 is "No", which teachers are they?

A/ Those who can effectively teach. ☐

B/ Those who can't effectively teach. ☐

C/ Teachers who lack professional ethics. ☐

D. Teachers who are new to the profession. ☐

TEXTBOOK PROVISION

9/ Is there shortage of textbooks in your school?

A/ Yes ☐

B/ No ☐

10/ If your response for question no. 9 is "Yes", how many books didn't you get?

A/ one ☐

B/ two ☐

C/ three ☐

D/ four ☐

E/ five

F/ six and above ☐

11/ What is the pupil-book ratio of the textbooks you obtained?

A/ 1:1 ☐

B/ 1:2 ☐

C/ 1:3 ☐

D/ 1:4 ☐

E/ 1:5 ☐

12/ If there is shortage of textbooks, how can you do different activities or take notes?

A/ By finding books privately from whatever source. ☐

B/ By exchanging the few books we obtained with my friends. ☐

C/ I don't do them for lack of textbooks. ☐

D/ No exercise is given by teachers. ☐

13/ As a result of shortage of textbooks, is instructional time wasted?

A/ Yes ☐ B/ No ☐

14/ If your response for question no 13 is "Yes", what is the proportion of wasted time?

A/ Approximately ¼ of instructional time.

B/ Approximately 1/3 of instructional time. ☐

C/ Approximately ½ of instructional time. ☐

D/ Approximately ¾ of instructional time. ☐

15/ Is there difference in your achievement between the subjects you received textbooks and the ones you didn't?

A/ Yes ☐ B/ No ☐

16/ If your response for question no. 15 is "Yes", what is the extent of the difference?

A/ considerable ☐

B/ moderate ☐

C/ insignificant ☐

17/ Have the portions for the first semester been covered in all subjects?

A/ Yes ☐

B/ No ☐

18/ If your response for question no. 17 is "No", how many subjects have not been covered within the given time ?

A/ one ☐

B/ two ☐

C/ three ☐

D/ four ☐

E/ five and above ☐

19/ If your response for question no. 18 is "No", what do you think the reason(s) is/are?

A/ Shortage of text books ☐

B/ Voluminous of the textbooks ☐

C/ Wastage of instructional time due to different reasons ☐

D/ Due to using supplementary materials to the textbooks. ☐

SCHOOL LIBRARY SERVICE

20/ Is there library service in your school?

A/ Yes ☐

B/ No ☐

21/ If your response for question no 20 is "yes", how effective/satisfactory is the service it renders?

A/ Very high ☐

B/ high ☐

C/ average ☐

D/ below average ☐

22/ Put in sequential order the following items in your library according to their quantity.

A/ reference books ☐

B/ textbooks ☐

C/periodicals and magazines ☐

D/ dictionaries ☐

E/ encyclopedia ☐

23/ How frequently do you utilize the library?

A/ Always ☐

B/ most of the time ☐

C/ sometimes ☐

D/ I don't utilize ☐

24/ If your response for the above question is "C", or "D" why?

A/ No assignment is given to be done from the library. ☐

B/ The library doesn't have relevant books. ☐

C/ The library is rarely open when needed. ☐

D/ I don't know how to use the library. ☐

25/ Have you ever borrowed books from your school library?

A/Yes ☐ B/ No ☐

26/ If your response for question no. 25 is "No", what is your reason?

A/ The library doesn't have enough copies of reference books. ☐

B/ Students don't have the demand to read books. ☐

C/ I don't know its importance. ☐

D/ There is no trained librarian in charge of the service ☐

SCIENCE EDUCATION PROVISION

27 / Does your school have science laboratory?

A/ Yes ☐ B/ No ☐

28/ If your response for question no 27 is "Yes", does it have enough chemicals and apparatus?

A/ It has sufficient chemicals and apparatus. ☐

B/ It has sufficient apparatus. but insufficient chemicals. ☐

C/ It has sufficient chemicals but insufficient apparatus. ☐

D/ It has insufficient chemicals and apparatus. ☐

29/ Does the laboratory have a trained technician?

A/ Yes ☐ B/ No ☐

30/ If your response for the above question is "No", how can the library function?

A/ By the concerned subject teacher. ☐ C/ It doesn't function ☐

B/ By a person without training ☐ D/ others ☐

31/ If your response for question no. 30 is "D", how are you able to learn science education?

A/ Only through explanations given by teachers. ☐

B/ Through the use of science kit materials. ☐ C/ others ☐

CLASS SIZE

32/ How frequently do you do the home and class work given by teachers?

A/ I do all the time. ☐

B/ I do most of the time. ☐

C/ I don't do most of the time. ☐

D/ I never do. ☐

33/ If your response for question no. 32 is not "A" why?

A/ Teachers rarely check them. ☐

B/ I don't have textbook. ☐

C/I don't have time. ☐

D/ I don't understand the lesson. ☐

34/ How do your teachers check homework and class work ?

A/ By getting students exchange their exercise books. ☐

B/ By getting students check their own exercise books. ☐

C/ They check themselves. ☐

D/ They never check. ☐

35/ If your response for question no.34 is "A", "B" or "D", why do you think?

A/ The number of students is very large in the class. ☐

B/ Students are negligent. ☐

C/ Teachers are not responsible. ☐

D/ others ☐

36/ Does each student readily get appropriate academic support from his/her teachers?

A/ Yes ☐ B/ No ☐

37/ If you response for question no.36 is "No" what do you think the reason(s) is/ are?

A/ Too many students in a class ☐

B/ Both students and teachers have rarely enough time. ☐

C/ Teachers are not willing to help students. ☐

D/ Students do not seek assistance. ☐

Interview questions to be answered by school directors and woreda and zone supervisors

The purpose of this interview is to gather information on the problems, practices and prospects of secondary education provision in the zone. In so doing, **the adequacy of qualification and number of teachers; the availability and shortage of textbooks; library and its service; laboratory apparatus and chemicals and class size** will be thoroughly discussed. The success of this study, thus, depends on the honesty, earnestness and frankness of your response. The student researcher would like to assure you that your responses are strictly confidential (kept secret). Thank you in advance.

PART I:PERSONAL DATA

1. Work place_____ 2. Age_____ 3. Sex_____
4. Qualification_____ 5. Year of experience:

5.1 as a teacher_____years.
5.2. as a director_____years
5.3. As a woreda/zone supervisor_____years

PART II. Guiding Questions

1. Are all the secondary school teachers well qualified for the subjects and grades they are teaching?
   A Yes ☐ B. No ☐
2. If your answer to question no. 1 is "no", what proportion of the teachers are sufficiently qualified? (Please indicate how many teachers out of what number are qualified)
3. If the teachers are not well qualified, do you think that the students acquire necessary skills and knowledge they expect of their teachers?
4 What solutions do you propose to overcome this problem?
5 Are all the teachers in secondary grades teaching the subjects in which they had training?
   A Yes ☐ B. No ☐
6 If your answer to question no. 5 is no, what percent of them are teaching the subject(s) in
which they were not trained?

7 What problems does this lack of relevant training impose
A) the learning of students?
B) the work of teachers?

8. What is the maximum and minimum number of students in a class of secondary schools?

9 What problems does large class (too many students in a class) create on the process of classroom instruction?

10 What do you suggest in order to solve this problem?

11 Are the books in the secondary school library contribute will to the effective learning of the students?

A Yes ☐ B. No ☐

12 If your answer to question no. 10 is "yes", what proportion(per cent) of the books are relevant?

_____

_____

13 If your response for question no 10 is "No", do you think that students can learn enough without further reading?

A Yes ☐ B. No ☐

14 Does each of the school libraries have a trained librarian?

15. Does the secondary school have science laboratory?
A Yes ☐ B. No ☐

16 If your answer to question no 13 is "yes", are there sufficient chemicals and apparatus in the library?
A Yes ☐ B. No ☐

17. If your response for question no.14 is "no", do you believe that students are learning adequately?
A Yes ☐ B. No ☐

18 . What solution(s) do you suggest?
A._____
B._____
.C. _____
D._____

19. If the school has science laboratory, does it have a trained technician?

A Yes ☐ B. No ☐

20. If the laboratory doesn't have a trained technician, how the laboratory .function?

_____

_____

_____

21 .What solution(s) do you suggest?

A._____

B._____

.C._____

D._____

22 Have all students obtained textbooks in the core subjects?

A Yes ☐ B. No ☐

23 .If your answer to question no. 20 is "no", how are teachers able to give homework and class work?

_____

_____

_____

24. According to your opinion, what are the consequences of no having text books in the main/important subjects?

_____

_____

_____

25 .What solution(s) do you suggest to alleviate the problem?

A._____

B._____

C._____

D._____

CHEMISTRY

Science Equipment and Chemicals for Grades 9-12

No	Description of items	Quntity
1	Chemical Balance, top loading double pan 120-200g x 10mg	2
2	Centrifuge, four head hand operated,for 2 or 4 100 x 16mm tubes with adaptor for 75 x 10mm, tube	2
3	Combusion tubes with short glass tube fused to one end to enable collection of reacting gases. Dimension 150 x15mm i.e. length x diameter	10
4	Glass tubing	
	a. 5mm o.d, soda glas in 1.5mm	20
	b. imm o.d soda glass 1.5mm	20
	c. Capillary, 6.5mm o.d 1.5mm soda glass	20
5	Glass rod. 6-7mm o.d soda glass in length of 1.5m	20
6	Reagent bottles, polythene 150ml	48
7	Filter papar,9cm, 1000 in box	2 boxes
8	Bunsen Burners, for bottles gas screw air regulator height 160mm	40
9	Wire Gauses, 15cm square iron with ceramic centre	40
10	Beakers, graduated, borsilicate with spout	
	a. 10ml squat	48
	b. 100 ml squat (pack of 12)	8 packs
	c. 100 ml tall	48
	d. 250ml squat	96
	e. 400ml tall	24
	f. 600ml tall	24
	g. 1000 ml tall	24
11	Sepasuring funnels	
	a. 100ml	4
	b. 250ml	4
12	Measuring Cylinder spouted	
	a. 10 ml	10
	b. 50ml	10
	c. 100ml	20
	d. 250ml (pol yproproylene)	20
	e. 1000 ,l (polyropylene)	4
13	screw Clips, 2cn	24
14	Filter funnels, 5 cm glass	24
15	Flasks	
	a. flat bottmed, 250 ml	24
	b. flat bottmed,500 ml	24
	c. round bottomed, 250 ml	24
	d. Conical, 100 ml	48
	e. Conical, 250 ml	48

No	Description of items	Quntity
16	Ther mometer, stirring	
	a. –10 to 110^0 Celsius	24
	b. 0 to 250^0 Celsius x 1^0	2
	c. –5 to 50^0 Celsius x 1^0	24
17	Test tubes, with rim, pyrex or borosilicates	
	A/ 75x10mm (pack of 144)	4 packs
	B/ 100x16mm (pack of 72)	20 packs
	C/ 150x25mm (pack of 72)	8 packs
18	Test tube racks	40
19	Test tube holders	40
20	Bungs, good quality rubber	
	a. Solid, assorted pack of 100	10 packs
	b. One hole 9mm pack of (20)	3 packs
	c. One hole 9mm pack of 20	4 packs
	d. One hole 9mm pack of 20	4 packs
	e. One hole 9mm pack of 20	4 packs
	f. One hole 9mm pack of 10	3 packs
	g. Two holes, 15mm pack of 10	3 packs
	h. Two holes, 15mm pack of 10	8 packs
	i. Two holes, 15mm pack of 10	8 packs
21	Watch glasses, 7.5 cm diam	48
22	Evaporating basins,	
	a. 100 ml capacity	48
	b. 250 ml capacity	48
	c. 500 ml capacity	24
23	Crystal lising basins borosilicate 25o ml capacity	48
24	Buchner funnel , plastica 10.5cm diam. (9 cm. Paper) to fit any container of neck 2.5 –s cm.	24
25	Spatulas	40
26	Filter pump,plastica,to be used with item 24	24
27	Tubing	
	a. rubber connecting, 5mm, bore	20m
	b. rubber bunsen 8 mm. Bore	40m
	c. rubber pressure 3-4mm wall	20m
	d. PVC. Clear, 5mm bore	60m
28	Safety screens, plastics 75 x 60 cm	10
29	Glass cutting knife hardened steel with expendable blades with 12 spare blades	2
30	Pipottes, graduated	
	a. 1 ml	24
	b. 5ml	24
	c. 10ml	24
31	Periodic chart (2x 1m)	6
32	Hazardous chemicals chart (1 x1m)	6
33	Laboratory first aid chart	6

34	Fire extinguisher, ABC type	3
35	Refiles for itrm 34	3packs
36	Fire aid kit (if not supplied separately)	
37	Cork borers sizes 1 to 6 plated metal cutting tube	2 set
38	Cork samll and Ø 12 cm large and Ø 15 cm	144
39	Cork samll and Ø 9 cm large and Ø 12 cm	144
40	Cork samll and Ø 21 cm large and Ø 24 cm	144
41	Mortar and pistle porcelain Ø 70mm with unglazed surace	5pcs
42	Fractional distillation apparatus comprizes 250 ml round bottom flask, 1 fractionating column 620 mm long, leibing condenser 500 mm long, 100ml conical fiask, three rubber atoppers, 0.9 m of tubing 5 mm bore, thermometer -10^0 to 110^0 c	4
43	Adapters, nyion T-shape for 3 to 5 mm bore	4
44	Adapters,plastic V-shape for bores of tubing 5 to 8 mm	24
45	U-Tube, glass 125 x 15 mm	10
46	Desicator glass pytex with knob cover and porforated matal disc Ø 163 mm disc below flange 86 mm	10
47	Gas Jars height 150 mm diameter 50 mm	24
48	Gas jar covmrs for the above gas jars	48
49	Crucible squat prcelain 15 ml	24
50	Crucible tongs black nod steel	24
51	Pip clay triangle 50 mm	48
52	Deflagrating spoon	40
53	Pipette bulb 25 ml	48
54	Burette 50 ml x 0.1 double	24
55	Graduted flasks 500 ml pyrex (spec-type)	4
56	Graduated flasks 250 ml pyrex	4
57	Atomic models, plastics, space filling type , not of high accuracy, to represent a large variety of molecules over 200 pieces in set)	2 set
58	Polystrame balls, in packs of 100 a. 12.5 mm b. 19 mm c. 25 mm d. 38 mm e. 45 mm f. 51 mm	 2packs 2 packs 2 packs 1 pack 1 pacs 1 pack
59	Chemical Test kit, containing bottles, droppers and tests for routine student analysis	10 sets
60	Gas preparation and Testing kit containing all apparatus for small scale collection and testing of common gasses for student use	5
61	Gas preparation kit, semi-micro scale, ground galass joints for teacher use	1 kit

Science Equipment and Chemicals for Grades 9-12 in UBD

No	Description of items	Quntity
62	Electrolysis cells, with electrodes holders	5
63	Gas Cylinders, (butane/ propane)as supplied to LSS	20
64	Adapters/ regulators to fit cylinders item 63.	10
65	Trolley laboratory, all steel construction	4
66	Acetamide	2x500g
67	Agar, powdered	2x500g
68	Aluminium chloride,hydrated	2x500g
69	Aluminium metal foil(4.5m roll)	2x500g
70	Aluminium metal powder	2x1kg
71	Aluminium ammonium sulphate	2x1kg
72	Aluminium potassium sulfate	2x1kg
73	Aluminium Sodium sulfate	2x500g
74	Aluminium sulphate	2x500g
75	Ammonium Chloride	2x500g
76	Ammonium dichromate	2x500g
77	Ammoniumdihydrogen orthopgosphate	2x500g
78	Ammonium iron sulphate	2x500g
79	Ammonium nitrate	2x500g
78	Ammonium iron sulfate	2x500g
79	Ammonium nitrate	2x500g
80	Ammonium Sulfate	2x500g
81	Ammonium thiocyanate	2x500g
82	Antimony metal lump	2x500g
83	Antimony metal powder	2x500g
84	Antimony oxide	2x500g
85	Barium chloride	2x500g
86	Barium metal in liquid paraffin	2x50g
87	Barium peroxide	2x500g
88	Bismuth metal lump	2x500g
89	Bismuth chloride	2x100g
90	Bismuth nitrate	2x500g
91	Bismuth oxide	2x500g
92	4-Bromdphenol Blue	2x25g
93	Calcium metal	2x100g
94	Calcium acetate	2x500g
95	Calcium carbonate (marble) chips	2x3kg
96	Calcium chloride anhydrous granules	2x500g
97	Calcium hydroxide	2x1kg
98	Calcium Oxide , quicklime	2x2.5g
99	Calcium sulphate	2x500g
100	Calcium sulphide tech.	2x500g
101	Carbon, lamp black	2x500g
102	Cerium sulphate	2x25g

103	Charcoal activated powder	2x500g
104	Charcoal, wood lump	2x1kg
105	Charcoal, wood, powder	2x1kg
106	Chromium Oxide	2x500g
107	Chromuim Sulphate	2x500g
108	Cobalt carbonate	2x250g
109	Cobalt chloride crystals	2x500g
110	Congo red	2x10kg
111	Copper metal foil	2x250g
112	Copper metal powder	2x100g
113	Copper metal turnings	2x500g
114	Copper (II) hydroxide carbonate	2x500g
115	Copper chloride	2x500g
116	Copper chromate	2x500g
117	Copper nitrate	2x500g
118	Copper (II) Oxide, powder	2x500g
119	Copper (I) Oxide, powder analer	2x500g
120	Copper oxide wire	2x500g
121	Copper Oxide	2x500g
122	Copper Sulphate	2x500g
123	1;6 –diamino hexano	2x100g
124	1;3 –dimitro-benzene	2x100g
125	Flourescein, soluble in alcohol	2x100g
126	Galaine leaf	2x500g
127	Galaine powder	2x500g
128	D (-) Glucose anhydrous	2x500g
129	L-Glutamic acid	2x500g
130	Graphite powder	2x500g
131	Hydrazine sulphate	2x100g
132	Hydroxile-ammonium chloride	2x500g
133	Iodine crystals	2x500g
134	Iron metal fillings, fine	2x500g
135	Iron chloride (Ferrous)	2x500g
136	Iron chloride (Ferric)	2x500g
137	Iron oxide	2x500g
138	Iron II Sulphate	2x1kg
139	Iron III sulphate	2x1kg
140	Iron sulphate	2x1kg
141	Lead metal foil	2x500g
142	Lead metal powder	2x500g
143	Lead metal rod, 150mm length	2x500g
144	Lead II acetate	2x500g
145	Lead bromide	2x500g
146	Lead carbonate	2x500g
147	Lead Iodine	2x500g

148	Lead nitrate	2x500g
149	Lead oxide (II)	2x500g
150	Lead oxide (IV)	2x500g
151	Lead oxide (III) and(IV)	2x500g
152	Lead tarta rate	2x500g
153	Lithium metal in liquied paraffin	2x50g
154	Magnesium metal powder	2x100g
155	Magnesium metal ribbon	2x25g
156	Magnesium carbonate	2x500g
157	Magnesium chloride, hydrated	2x500g
158	Magnesium oxide, heavy	2x500g
159	Magnesium sulphate hydrated	2x500g
160	Magnesium sulphate, anhyddrous	2x500g
161	Manganese	2x500g
162	Manganese oxide (Natural pyrolusite)	2x500g
163	Mercury metal	2x500g
164	Mercury chloride	2x500g
165	Mercury (II) oxide, red	2x500g
166	Methyl Violet	2x100g
167	Naptalene flake	2x1kg
168	Nickel metal thin sheet (0.15mm)	2x500g
169	Nickel carbonate	2x500g
170	Nickel sulphate	2x500g
171	Nitrotoluene	2x500g
172	Oleic acid	2x500g
173	Paraffin wax, 54-57 oc	2x500g
174	Pesin powder	2x500g
175	Perspex chips	2x500g
176	Phenol,crystals	2x500g
177	Phenol red solution	2x100ml
178	Phenyl salycylate	2x250g
179	Phosphorous,stick yellow	2x500g
180	Potassium metal in liquid paraffin	2x200g
181	Potassium bromide	2x500g
182	Potassium carbonate, anydrous	2x500g
183	Potassium chlorate	2x500g
184	Potassium chloride	2x500g
185	Potassium Chromate	2x500g
186	Potassium chromium sulphate	2x500g
187	Potassium dichromate	2x500g
188	Potassium fluride, anydrous	2x500g
189	Potassium hexacyanoferrate (II) 3-water	2x500g
190	Potassium hexacyanoferrate (III)	2x500g
191	Potassium hydrogen sulphate	2x500g
192	Potassium iodide	2x500g

193	Potassium nitrate	2x500g
194	Potassium permangenate	2x500g
195	Potassium sodium tartrate	2x500g
196	Rubidium chloride	2x5g
197	Sand, silver	2x2kg
198	Silicagel self indicating	2x1kg
199	Silver metal foil	2x25g
200	Silver metal wire	2x25g
201	Silver nitrate	2x500g
202	Soda-lime 4-10 mesh	2x500g
203	Sodium metal in liquid paraffin	2x500g
204	Sodium acetate, hydrated	2x500g
205	Sodium carbonate, anhydrous	2x1kg
206	Sodium chloride	2x1kg
207	Sodium hydrogen carbonate	2x1kg
208	Sodium hydrogen sulphate, hydrated	2x500g
209	Sodium hydroxide pellets	2x1kg
210	Sodiummetabisulphite	2x500g
211	Sodium nitrate	2x1kg
212	Sodium salicylate	2x500g
213	Sodium silicate	2x2.5g
214	Sodium sulphate hydrated	2x1kg
215	Sodium sulphate	2x1kg
216	Sodium thiosulphate, hydrated	2x500g
217	Starch soluble	2x500g
218	Strontium chloride, hydrated	2x500g
219	Strontium sulphate	2x500g
220	Sugar cane sucrose	2x100g
221	Sulphur flowers	2x1kg
222	Sulphur,roll	2x1kg
223	Tannic powder	2x2.5kg
224	Tannic acid	2x500g
225	D (-) tartaric acid	2x500g
226	Tin metal foil	2x100g
227	Tin metal powder	2x500g
228	Tin bromide	2x500g
229	Tin (II) oxide	2x500g
230	Tin chloride	2x500g
231	Tin (IV) oxide	2x500g
232	Uranyl nitrate natural	2x25g
233	Urea	2x500g
234	Vaseline	2x500g
235	Zeolite (sodium) exchange resin standard	2x500g
236	Zinc bromide	2x500g
237	Zink metal foilZink metal foil	2x500g

238	Zinc metal, granulated	2x500g
239	Zinc chloride	2x500g
240	Zinc nitrate	2x500g
241	Zinc oxide	2x500g
242	Zinc sulphate	2x500g
243	Acetate acid	2x2.5liter
244	Acetate anhydride	2x500ml
245	Acetone (propanon)	2x2.5liter
246	Ammonia solution 0.91 sp gr	2x2.5liter
247	Amyl acetate (pentyl acetate)	2x50ml
248	Aniline	2x500ml
249	Benzine	2x1liter
250	Bromide	2x3liter
251	Bromo-phenol blue, 0.1% in ethanol	2x50ml
252	N- butanol	2x1liter
253	Test-butyl alcohol	2x1liter
254	Carbon tetrachloride	2x2.5lietr
255	Congo red 0.2% in ethanol	2x100cm
256	Crude petroleum	2x2.5liters
257	Cyclchexene	2x2.5liters
258	1.2 –dichlo-ethanol	2x50ml
259	1.2 –dichlo-ethebe	2x500cm
260	Diphenylamine, 2% in acetone	2x100cm^3
261	Ethanol (industrial Methylated Spirits)	2x2.5liters
262	Ether (diethyl)	2x500ml
263	Ethyl acetate	2x1liter
264	Fehling's solution no.1	2x2.5liters
265	Fehling's solution no.2	2x1liter
266	Formaldehyde 40%	2x2.5liters
267	Formic acid	2x500ml
268	Glycerol	2x500ml
269	n-heptane	2x2.5liters
270	Hydrochloric acid, coonc.	2x2.5liters
271	Hydrogen peroxide 30%	2x1liter
272	Hypophosphorous acid 50%	2x500ml
273	Linseed oil	2x500cm^3
274	Litmus paper blue	2x24 books
275	Litmus paper red	2x24 books
276	Litimus solution	2x100ml
277	Universal indicator paper PH 1-10	2x12books
278	Methanol	2x500ml
279	Methyl orange indicator solution	2x100ml
280	Ninhydrin spray 0.5% in alchhol container of 120ml	2x1
281	Nitrric acid conc.	2x2.5liters
282	n-octane	2x500ml

283	Olive oil	2x500cm^3
284	Oxalic acid	2x500g
285	Paraffin, liquid colorless	2x2.5liters
286	n-pentane	2x2.5liters
287	Petroleum spirit, 60-80^{0}c	2x2.5liters
288	Phenol red, 0.1% in ethanol	2x100ml
289	Phenolphthalein indicator	2x100g
290	Ortho-phospheric acid,85%	2x1.5liters
291	Phosphorous chloride	2x500cm^3
292	n-propanol	2x500ml
293	2-propanol	2x1liter
294	1-bromo-propane	2x100cm^3
295	Pyrogallol 40%	2x100g
296	Sea-water tablets	2x500tab
297	Styrene	2x2.5liters
298	Sulpheric acid, cone	2x2.5liters
299	Teepol	2x2.5liters
300	Tetrachlorcethanol	2x2.5liters

EQUIPMENT FOR BIOLOGY GRADES 9-12

S.N	Description of Items	Quantity
	A. OPTICAL EQUIPMENT	
1	Pocket Student	
	Magnifier, doublet lens system 10x	
	Magnification, magnifier in metal folding frame which slides into a protective vinyl cases	30
2	Standard insta-Focus Binoculars, 7x50(7mm exit pupil, light weight, field of view about 150 meter at 1km.) with carrying case and neck strap)	2
3	Basic 50x, 100x,400x microscope, castemetal base and arm, adjustable stop to prevent damage to slides and lenses triple revolving nosepiece with positive stops and 5x,10x and 40x achromatic objectives. A 10x wide field eyepiece. 35mm x 90mm metal stage with lock-on stage clips and six aperture disc diaphragm. Rack and pinion focus control. Plano-concave mirror illuminator. Inclined eye tube that rotates 360^0.)	10
4	Microscope	
	Accessory:eye piece,10x wide field	1
5	Microscope accessory: Objective,5x achromatic	1
6	Microscope accessory: Objective, 10x achromatic	1
7	Microscope accessory: Objective,40x achromatic	1
8	Microscope accessory:Plano-concave Mirror	3
9	Stereomicroscope (Binocular: with reversible black or white base plate; working distance 78mm; objective 2s; 5.1mm fiels eyepiece 20x with rubber eye caps; stage clips; protective eyepiece dust caps and vinyl cover.)	1
10	Plastic Microscope slide (75x25mm; PKG of 144.)	10 PKGS
11	Plastic coverslips (22x22mm;Box of 100)	10 Boxes
12	Glass coverslides (22x22mm; No.2 thickness; per oz, or per 30 gms.)	
13	Concavity slides (75x25mm; 1.5mm thick; 18mm x 0.8mm concavity; PKG of 12.)	3 PKGs
14	Handheld light meter (with ± 15% accuracy from 10 -1000fc.; color and cosine corrected,)	1
15	Slide Boxes (Polystyrens; for slides of 75x25mm; 100-capacity	1
	B) GLASSWARE	
16	Aquarium (All glass; 50x25x30cm.)	2
17	Petri dishes (pyrex; 100x15mm capacity; comes in bulks of 72.)	30
18	Dropping bottles (Amber glass; 60ml.; glass pipet in screw cap with rubber bulb; package of 12).	1 pack
19	Beakers (Pyrex; 10ml graduation; 50ml capacity	10

20	Beakers (Pyrex; graduated; 100ml)	10
21	Beakers; (Pyrex; graduated; 300ml	30
22	Beakers; (Pyrex; graduated; 400ml	30
23	Cylinder (Glass; graduated; 100ml	5
24	Burette (flint glass; graduated; with stopcock; 50ml.)	10
25	Pipets (Pyrex; graduated in 0.1ml intervals; 2ml capacity pack of 10.)	1 PKG
26	Dropping pipet (Glass; with rubber bulb and glass dropper; 2ml. Capacity; package of 12)	2 PKGs
27	Test tubes (Pyrex; with rims; 18mmx150mm;PKG of 144.)	2 PKGs
28	Reagent bottles (Narrow mouth Amber glass bottles; with caps 120ml)	20
29	Funnels (Pyrex; short stems; with stem length approximately same as diameter; top diameter 100mm.)	5
30	Glass tube (Flint glass; in 1.5 meter length; external diameter 7mm; found in 450g. Quantities i.e. 20 pieces in 450g.)	225g
31	Elenmeyer Flasks (Pyrex; student grade; narrow-mouthed; graduations accurate to 15%; 250ml. Capacity.)	25
32	Watch glasses (Pyrex; 65mm diameter.)	10
33	Ball jar (Pyrex; 30cm. Hx20cm diameter).	1
34	Distilling flasks (Pyrex; with round bottom and long neck; 250ml. Capacity.)	2
35	Glass plates (15x15cm. Smooth edged.)	2
36	Glass rods (Standard flint glass; 6mm diameter; 1 meter long; PKG of 6)	1 PKG
37	Glass stirring rods (15 cm. Long; 6mm diameter; PKG of 10)	1 PKG
38	Liebig condenser (borosilicate glass; with removable inner tube to plastic nuts to rummer washers; 300mm Jacket; 500mm condenser tube.)	1
	C) PLASTICWARE	
39	Covered aquaria (Plastic; rectangular; 33cmx20cmx18cm)	3
40	Syrings (Plastic; disposable; 19cc.)	10
41	Syrings needles to fit the above item, (300 longx 0.6mm diameter)	20
42	Tote boxes (Light weight; polypropylene; 30cm x 18cmx12cm.)	3
43	Platic pots (15cm. Diameter; PKG of 10.)	2 PKG
44	Specimen storage tubes, (flexible plastic storage tubes: with transparent slip-on caps; 3cmx50m; PKG of 10 tubes with 20 caps.)	2 PKG
45	Stoppers (No hole) (Rubber; top diameter 20mm; bottom diameter 16mm; 54PCS Per 450gm.)	225g
46	Utility funnels (Polyethylene, 60mm diameter and 76mm height.)	10
47	Plastic case for dissecting set (Molded; with built in instrument compartment; polypropylene; size 8x17x19cm)	15

48	Laboratory apron (Vinyl; halter design; 1.1 meterx 70cm.)	1
49	Rubber tubing (elastic; assorted sizes' (1000 appron)	1
50	Rubber tubing (Red: intenal diameter 6.5mm; packed in semeter rolls)	5 meter
51	Stoppers (two-hole)(Rubber:two hole: can fit to 250 ml Erlenmeyer flask: packed as item No.45 above)	225g
52	"Y" –tube (polypropylene ;6 mm diameter PKG of 10.)	1 PKG
53	Stopper (No-hole) (white ,25mm balls : PKG of 144)	½ PKG
54	Stopper (one –hole) (Rubber ; fitting the distillation flask atitem No,34)	10
55	Stopper (NO-hole (Ruber ; top diameter 32mm ;bottom diameter 26 mm ;)	10
56	Stopper (onme- hole) (Rubber;top dimeter 32mm ; bottom diameter 26 mm ;)	10
57	Baloons (Rubber ; Red color .)	20
58	Test tube Rack (Polyfoam ; supports 48 test tubes; 36x 13x14cm.)	1
59	Test tube brush (white bristle; 10cm broush x 3cm diameter x 25cm length; PKG of 12)	½ PKG
60	Quadrat (10 cm squqre; transparent plastic; with cm2 grid in black ilnes)	10
	D) METALWARE	
61	Stoddard test tube clamp (plain : brass- wire; jaw opening for up to 25mm diameter tubes; 12cm. Long; PKG of 5.)	1 PKG
62	Liquid fuel burner (metal; with screw cap, wick, and metal wick holder; 120ml; capacity.)	5
63	Tripod (enameled cst iron; with detachable 23 cm legs; circular top pf one ring; 12mm diameter)	3
64	Scalpel handle (No.3) (lock-on; stainless steel; 12.4cm.)	30
65	Scalpel handle (No.10)	30
66	Scalpel blades (no.11)	30
67	Surgicl scissecting scissors (sharp point; plated carbon steel; 11.4 cm.)	10
68	Surgical scissecting (blunt point; stainless steel; 11.4cm.)	10
69	Student dissecting forceps (Broad pointed; nikel handle and tips; stainless steel; 11.4cm)	15
70	Dissecting forceps (fine pointed; serrated handle and tips: stainless steel; 11.4cm)	10PCS
71	Dessecting needles (straigh teasing neesle; with wood handle; 14.6 cm.)	30 PCS
72	Insect pins (No.3) (brass head; sharp point; black Japanned finish; PKG of 100)	2 PKGs
73	Lab Incubator (with +0.25^{0}c temp. control; two shelves; 0.7 cu.ft.capacity; Aluminium interior; seethru acrylic door; Interior 25x 30x 25cm; Temp. range.to 62^0 c; power 120 v, 100w.)	1
74	Laboratory spatula (stainless steel; hardwood handle; blade	5

	14mmx 10mm.)	
75	Stand (support) rod and base. (base is rectangular 10x 15cm. ; rod is zinc plated steel 50cm. Long.	10
76	Adjustable clamp holders	10
77	Economy burette clamps (steel clamps; with round jaw of 3.5cm opening.)	10
78	Razor blades (single edge: stainless steel; Box of 100.)	1 Box
79	Fine wire thread (bare copper magnet wire; 10m, wire on a spool .)	
80	Anatomy wall charts for classroom use of a highschool lavel. Set of 14 charts folded to acompact in a reusable poly case. Charts measure 74cm x 94 cm . a. Skeletyal system b. Muscuar system c. Lungs, liver, intestinges and colon d. Heart and kidneys e. Brain, eye and ear f. Nose, mouth, throat g. Positions of organs h. Circulatory system i. Nervous system j. Female and male reporductive systems k. Glandular system l. Muscles' and nerves m. Comparison, male and female structure n. Areties and veins These color ful wall charts come with descriptive text, glossary and index. Set of 14 charts	1 set
81	Turtone Bilogy survey set (A comprehenive survry and reference set of Turtox classroom charts. Set covers botany, zoology, embryology, parasitology, entomology and genetics. Set of 50.)	½ set
	F) CHEMICALS	
82	Acetone (SCIgr .)	25 litres
83	Benedict's solution	2 litres
84	Calcium Hydroxide solution (saturated)	2 litres
85	Chloroform (SCIgr.)	2.5 litres
86	Copper sul fate CuSo 4.5h20	2x 1kg
87	Diammonium Phosphate (NHC)s HP04	2x500g
88	Ethanol Ch 2 ch 20H (95%)	2x500g
89	Formal dehydar, anhydous, SCIgr.	5 litres
90	Glucose, granular, anhydrous, SCIgr.	5 litres
91	Glycerol C3Hc (OH)3;	1kg
92	Hydrogen peroxide solution, 3% SCIgr.	500 Ml
93	India ink (per 30 grm or 30 ml)	500Ml
94	Indine solution (solution. O.IM	2
95	Hydrochloric acid, solution, O.1M	2
96	L-Ascorbic acid, SCIgr. (per 100g.)	2x2.5 litres

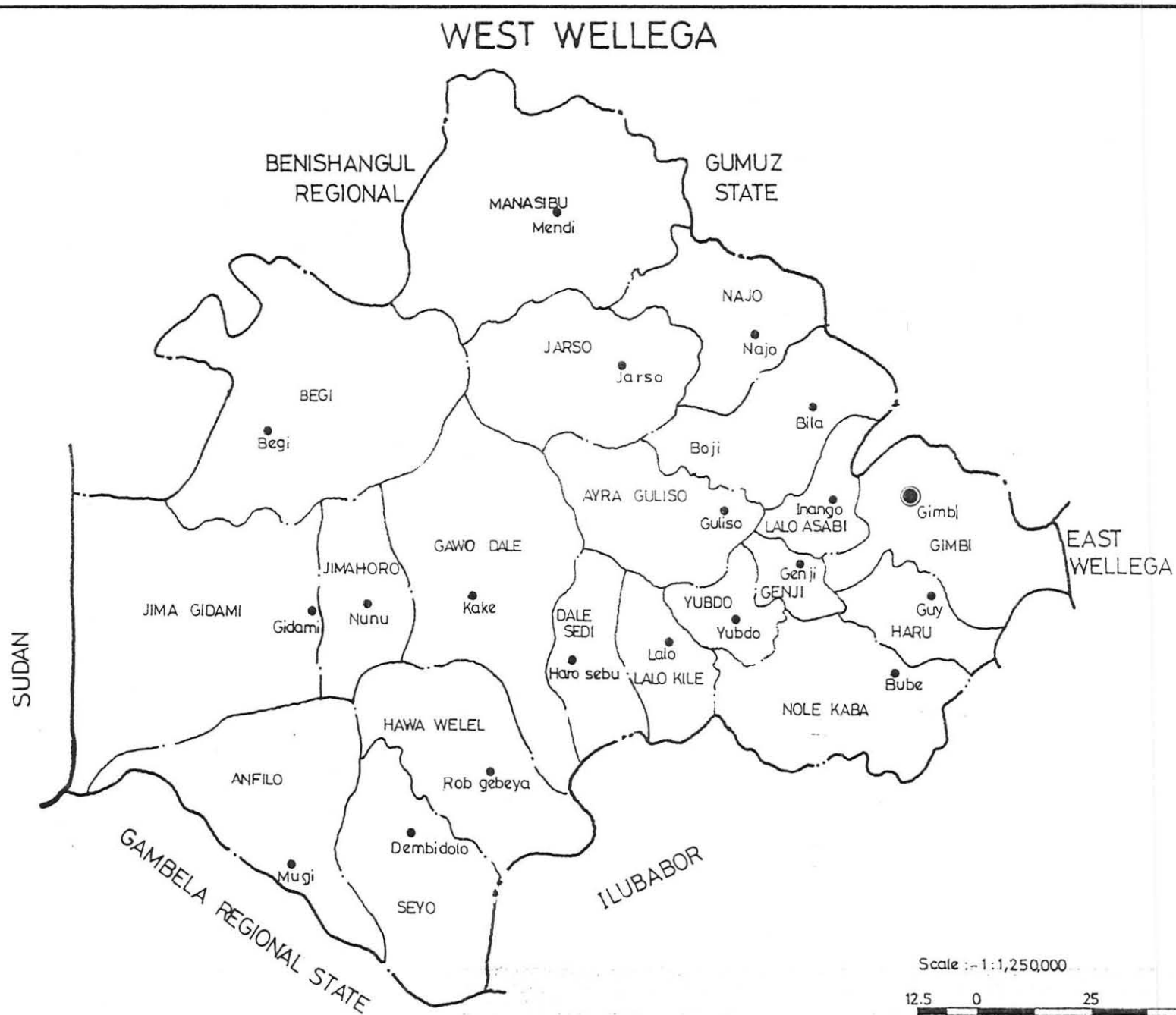
97	Methlene Blue (stain)	3
98	Nitric acid, concentrate	10g
99	Olive oil , SCIgr.	2x2.5 litres
100	Parafin oil (per 500ml)	500ml
101	Sodium chloride, SCIgr,	4x500ml
102	Sodium hydroxide, pellets, SCIgr.	3x1kg
103	Sodium hydroxide, Solution, 50%	2x500g
104	Starch, soiuble	4x500Ml
105	Sucrose, granular, SCIgr,	2x500g
106	Sodium citrate, garanular, SCIgr.	2.5 kg
107	Sodium carbonate, granular, anhydous, ACIgr.	2x500g
108	Soda lime, granular, ACIgr	2x500g
109	Cobalt chloride test paper, (sheet, 20 x 25 cm., Blue-pink color change, package of 12 sheets)	500g
110	PH Test paper strips. (Acid- neutral-base test paper, a single PH test paper to indicate PH value in the acid or the nautral or the basic range by a distinct color, 100 strip each =PKG of 1200 strips.	2PKG
111	Toluene C1H1CH1,SCIgr.	4x500ml
112	Acetic acid (vinegar) solution 3 2/5	4x500ml
113	Yeast, Baker's dry	500g
114	Dichlorophenol-Indo-phenol (DCPIP)	2g
115	Diethyl ethain	1 liter
116	Ecsine B (Stain)	100g
117	Beef extract powder (12.5 2.5 N)	100g
118	Agar Powder	250g
119	Potassium Iodide solution	1 liter
	G.OTHERS	
120	Student platform scale (balance)Metal scale, with removable oval tray; measures up to 5kg.; size 15x23x10cm.)	
121	Spot plates (porcelain; acid resisant; size 11x9cm.;with 12 degression.)	10
122	Scales located side by side ; size 15x5cm.; Range-20^0 to 50^0c; divisions 2^0 .	10
123	Student Grad filter paper. (diameter 90mm; Boxes of 100).	100Boxes
124	Plat press (strong 48x 30 cm. Frame; with 2 cloths webbing straps; 12 blotter sheets; and 12 corrugated ventilator sheets)	1
125	WARD's standard buttarfly not (S8cm diamter ring; with nylon mesh bag attached to 90 cm, wooden handle.)	5
126	WARD's Aquatic net (canvas reinforced net with hardwood handle	1
127	Cotton (Non-sterile; absorbent; in PKG of 500g.)	2PKG
	total	

LIST OF APPARATUSES FOR **PHYSICS** LABORATORY

S.N	Description of Items	Quantity
1	Double beam balance	6
2	Bell Jar-height 250cm dia. A50mm	6
3	Bowl (Polythene, circular)	6
4	Bowl (Polythene, rectangular)	6
5	Burner (methylated spirit)	6
6	Measuring cylinders ($100cm^3$)	12
7	Flask,flat bottom ($250cm^3$ & $500\ cm^3$)	12
8	Flask-conical, $25cm^3$)	12
9	Measuring jugs ($100cm^3$)	6
10	Ruler-Hard wood (1m)	12
11	Ruler-Hard wood (1/2m)	12
12	Overhead projector	1
13	Accessories for overhead projector	1set
14	Tripod scree, photax (1200x1200mm)	1
15	Air pump, exhausting and condensing	1
16	Laboratory stopwatch (minute times)	6
	PHYSICS LABORATORY	
1	Displacement vessel (Tin)	6
2	Spring balance (Newton scale) (0-25)	6
3	Set of masses (with hanger) slotted ones	1set
4	Masses-(with lifted ring), (1kg-10kg) Material kit	1
5	Pulley cone bearing	6
6	Pulley-plain bearing	6
7	Pulley block	6
8	Cycle wheel pulley	1
9	Cord and twine	2 reels
10	Wheel and axle, compoung	1
11	Parallel gears kit	1set
12	Demonstration engine models two stroks petrol engine	1
13	Four stroke petrol engine model	1
14	Four stroke diesel engine	1
15	Linear air track	1
16	Accessories for use with linear air track	1set
17	Trolleys and accessories	1set
18	Electic timing device (ac)	6
19	Electic timing device (dc)	6
20	Power supplies for electric tinning device	6
21	Accessories for use 21	2set
22	Centripetal force apparatus	6
23	Inclined plane and friction board	6

24	Accessories for use of item 24	6set
25	Spring, estension, steel (length 100mm)	12
26	Elastic materials kit	6
27	Hare's apparatus, (U tube)	6
28	Boyle's law apparatus	6
29	Liquid level apparatus	6
30	Lift pump	2
31	Force pump	2
32	Manometer	6
33	Ball and ring	6
34	Iron rods (linear exansion)	6
35	Lnear expansion apparatus	6
36	Compound bar-brass & invar	6
37	Charles' law kit	1
38	Calorimeter, set	6
39	Calorimeter, Joules	6
40	Immersion heater (electric)	12
41	Large moter (generator)	1
42	Lamp unit /holder	12
43	Fly wheel unit	1
44	Concave mirrors	12
45	Convex mirrors	12
46	Half lenses	12
47	Lens, doule convex	12
48	Lens, double concave	12
49	Condeser lens, plane-convex	12
50	Eyepiece lens, plane conex	12
51	Microscope objective lenses	12
52	Lens, cylindrical, double convex	12
53	Lens, cylindical, double concave	1
54	Lens holder	6
55	Glass blok, rectanguar	6
56	Prism, glass, 60^0 x60^0x60^0	6
57	Prism,glass (90^0x45^0x45^0 opti kit	2
58	Electric bell	2
59	Wire holix (slinky)	6
60	Steel spring, narrow (20m diaxx3m longs, extension to 10m)	6
61	Wave model	2
62	Wave model accessories	2 sets
63	Ripple tank	1
64	Spare parts for ripple tank	1 set
65	Accessories for use with ripple tank	1 set
66	Hand stroboscope, simple form	+
67	Ripple tank supply unit (wave generator motor)	1
68	Sonometer, simple pattern	6

69	Tuning forks (set) 256HZ 7 512 HZ)	2 from each
70	Tuning fork on resonance boxes set of three forks	6
71	Rectangular section magnetizing coil	12
72	Horseschoe magnets,	6
73	Magnetising and demagnetizing coil	6
74	Electromagnet kit	1set
75	U bend, iron	6
76	Electromaget	6
77	Magnetometer	6
78	Magnetic needle	6
79	Needle stand	6
80	Plotting comass	12
81	Glass rod	12
82	Ebonite rod	12
83	Nylon thread	2reels
84	Polystyrene spheres	1gross
85	Vande Graaf generato (hand drive)	1
86	Accessories and spare for vande Graaf genertor	1
87	Electrophorus, simple form	12
89	Brass cone (tripod) insulated	6
90	Pair of spheres, insulated	6
91	Lair electolytic capacitors	2
92	Leyden jar, with removable coating	6
93	Electoscope-simple flask type	6
94	Dual purose electroscope	2
95	Dissectible transformer	2
96	Rheostat capacitance	6
97	Resistance set	2 set
98	Variable capacitance	1 set
99	Open wound solenoid	6
100	General purpose transformer	1
101	Connecting wires	24
102	Crocodile clip	24
103	Copper wire (bare) Iron wire	2 reels
104	Iron wire	2 reels
105	Resistance wire, manganin wire,bare	2 reels
106	Flash lamp bulbs, round (2.5v,0.3A)	24
107	Lamp mains (15w)	24
108	Ammeter- dual range (Oto 1A,)O to 5A	6
109	Voltmeter dual range D-3v,c-12v)	6
110	Galvanometer (center zero galvanometer)	6
111	Universal indicator	2
112	Multimeter	1
	Grand Total	


WEST WELLEGA
BENISHANGUL REGIONAL
GUMUZ STATE
MANASIBU
Mendi
NAJO
Najo
JARSO
Jarso
BEGI
Begi
Bila
Boji
AYRA GULISO
Guliso
Inango
LALO ASABI
Gimbi
GIMBI
EAST WELLEGA
GAWO DALE
JIMAHORO
Genji
GENJI
JIMA GIDAMI
Gidami
Nunu
Kake
DALE SEDI
YUBDO
Yubdo
Guy
HARU
Haro sebu
Lalo
LALO KILE
Bube
NOLE KABA
SUDAN
HAWA WELEL
ANFILO
Rob gebeya
Dembidolo
Mugi
SEYO
GAMBELA REGIONAL STATE
ILUBABOR
Scale :- 1:1,250,000
12.5 0 25 50
KILOMETRS

DECLARATION

I, the undersigned, declare that this thesis is my original work, has not been presented in any other university and that all sources of materials used for the thesis have been duly acknowledged.

Name: Kumarra Shiferraw

Signature: 

Place :Department of Educational Planning and Mnagement

Date of submission July 09, 2004