

**ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES**

**THE PRACTICE OF STUDENT-CENTRED METHODS AND
CONTINUOUS ASSESSMENT IN TEACHING SCIENCE IN
OROMIA TEACHERS' COLLEGES**

BY DEREJE ABDI

**A Thesis Submitted in Partial Fulfilment of the
Requirements for the Master Degree of Art in
Curriculum and Instruction**

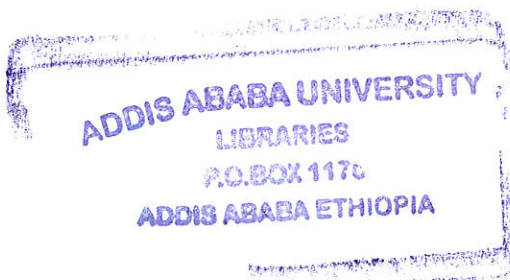


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Table of Contents

	Pages
Acknowledgments.....	i
Table of Content.....	ii
List of Table	v
List of Acronyms	vi
Abstract	vii
CHAPTER 1: INTRODUCTION	
1.1 Background of the Study	1
1.2 Statement of the Problem	3
1.3 Objectives of the Study	7
1.4 Significance of the Study	7
1.5 Delimitations of the Study	8
1.6 Limitations of the Study	8
1.7 Definitions of Key Terms.....	9
1.8 Organization of the Study.....	9
CHAPTER 2: REVIEW OF THE LITERATURE	
2.1 Philosophical Views of Instruction	11
2.1.1 Positivist Approach to Teaching and Learning.....	12
2.1.2 Constructivist Approach to Teaching and Learning	12
2.2 Science Education	13
2.3 The Methodology of Instruction	14
2.3.1 Teacher-Centered Method.....	14
2.3.2 Student-Centered Methods	15
2.3.2.1 Characteristics of Student-Centered Instruction	16
2.3.2.2 Rationale of Student-Centered Methods of Instructions.....	16
2.4 Methods of Teaching Science	17
2.4.1 Constructivist Approach in teaching Science.....	18
2.4.1.1 Cooperative Method.....	19
2.4.1.2 Discussion Method	19

2.4.1.3 Discovery Method	20
2.4.1.4 Project Method	20
2.4.1.5 Problem Solving Method	21
2.4.1.6 Practical Activity.....	22
2.4.1.7 Role Play	23
2.5 Science Teachers in Student – Centered Method	24
2.6 The Concept of Assessment	26✓
2.6.1 Types of Assessment	26
2.6.2 Assessment Practice in Student-Centered Method	27
2.6.3 Purposes of Assessment.....	28✓
2.7 Assessment in Science Education	30
2.8 Science Education in Ethiopia	31
2.9 Factors Affecting the Application of Student- Centered Methods and Assessment Practice	32
2.9.1 Teachers' Training	32✓
2.9.2 Teachers Attitude	32✓
2.9.3 Students Attitude	33
2.9.4 Resource	33

CHAPTER 3: REASEARCH METHODOLOGY

3.1 Research Method.....	34
3.2 Sources of Data	34
3.3 Sample Population and Sampling Techniques.....	34
3.4 Data Collection Tools	35
3.4.1 Interview.....	35
3.4.2 Questionnaires	35
3.4.3 Classroom Observation	36
3.4.4 Document Analysis	36
3.5 Procedures of Data Collection	36
3.6 Methods of Data Analysis	37

CHAPTER 4: PRESENTATION AND ANALYSIS OF DATA

4.1 Characteristics of Respondents.....	38
4.2 Teachers Training	41
4.3 Instructors Interest to Science Teaching	44

4.4 Relations between General objectives and specific Objectives of Science	45
4.5 The Practiced Teaching Methods.....	47
4.6 Students' Attitude	53
4.7 Availability and Adequacy of Resources	54
4.8 Assessment practiced	59
4.9 Instructors and Students Perception	66
CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS	
5.1 Summary	73
5.2 Conclusion	75
5.3 Recommendations	77
REFERENCES	79
APENDIX A.....	85
APENDIX B.....	94
APENDIX C	99
APENDIX D.....	100
APENDIX E	103

List of tables

Page

Table 1: Levels in inquiry in science laboratory	23
Table 2: Comparison of teacher-centered and student-centered approach of Assessment.....	28
Table 3: The number of selected samples	35
Table 4: Characteristics of the respondents	39
Table 5: Instructors and academic deans teaching load	40
Table 6: Views of instructors on their training	41
Table 7: Instructors response on the main reason for the failure to use student- centered methods and continuous assessment	42
Table 8: Instructors response on the match between suggested methods in the modules and actual practice	43
Table 9: Reasons of instructor on the mismatch between the suggested teaching methods in the modules and the actual practice in the classroom	43
Table 10: Instructors perceptions of their profession	44
Table 11: Reasons of instructors regarding dissatisfaction in science teaching	45
Table 12: Views of instructors on the relation between general objectives of science education and the objectives of specific courses	46
Table 13: The extent to which student-centered methods have been practiced in the sample colleges (rated by students)	47
Table 14: The extent to which student-centered strategies have been practiced in the sample colleges (rated by instructors and students)	48
Table 15: Views of instructors regarding the attitude of students towards student- centered methods and continuous assessment.....	53
Table 16: Views of respondents regarding the availability and adequacy of Resources	55
Table 17: The extent to which the instructors have been practicing continuous assessment in the sample colleges	59
Table 18: Responses regarding follow-up assessment by instructors	63
Table 19: Responses of instructors and students about their perception of student- centered methods and continuous assessment	66

Abstract

This study described how instructors are being applied student-centered approach in teaching science. It also examined how continuous assessment techniques are being practiced in teaching science. The study was conducted at randomly selected Oromia Techers' College; Assela, Robe and Sebeta Teachers' Colleges. Accordingly a sample 286 of science students (1st and 2nd year) and 38 of science instructors were included in the study. Descriptive survey method was employed to accomplish the study. Academic deans, instructors and students were the source of data for the study and Questionnaire was the main data gathering instrument which was supported by interview, observation and document analysis. The data gathered through these instruments were analyzed using percentages, mean scores, chi-squares and descriptive statements and all differences were tested for statistical significance at the 0.05 alpha level. The study showed that the practices of student-centered method and continuous assessment in teaching science were weak. The major reasons were large number of students in the class, shortage of time and students' miss perception about student-centered method and continuous assessment. Furthermore, the study revealed the impact of colleges and classroom facilities on the succesful practice of student-centered methods and continuous assessment techniques. The study also revealed that instructors lack of appropriate pre-service training as one of the major problems in the practice of student-centered methods. Generally, the study showed that instructors of the sample colleges did not properly applying the student-centered methods and continuous assessment. They mostly used traditional teaching methods and assessment techniques. Thus, it is underlined that the concerned bodies should take the necessary measures in order to change the current state of science education in the region.

List of Acronyms/Abbreviations

AAPT:	American Association of Physics Teachers
BED:	Bachelor of Education
BSC:	Bachelor of Science
CA:	Continuous Assessment
ESS:	Education Sector Strategy
ICDR:	Institute of Curriculum Development and Research
IICBA:	International Institute for Capacity Building in Africa
MED:	Masters of Education
MSC:	Masters of Science
MOBECN:	Ministry of Basic Education and Culture of Namibia
MOCB:	Ministry of Capacity Building
MOE:	Ministry of Education
NETP:	New Educational and Training Policy
OEB:	Oromia Education Bureau
SCM:	Student-Centered Method
SIDA:	Swedish International Development Agency
TESO:	Teachers' Education System Overhaul
TGE:	Transitional Government of Ethiopia
UNESCO:	United Nation Education, Scientific and Cultural Organization.

CHAPTER 1: INTRODUCTION

1.1 Background of the Study

Education is often regarded as the most determinant factor for socio-economic development of countries. It is obvious that no countries have achieved developmental goals without successful education and training programs. However, the education system at different times of our country was noted for reinforcing factual knowledge through academic, content-centred curriculum, teacher-centered instruction, and rote memorization oriented assessments. The New Educational and Training Policy noted that absence of interrelated contents and modes of presentations were major challenges of the education system (MOE, 1994). In response to these challenges recent education reforms proposed changes in the school curriculum, mode of delivery, teacher education programs and the assessment techniques (MOE, 2002).

The reforms proposed strategies to make the education system more responsive to societal needs. The recommendations included: greater emphasis upon problem solving mode of delivery at all levels, enhancing the quality of teachers, employing effective teaching methods and assessment techniques, and disseminating science and technology. Thus, a shift in teaching methods and assessment techniques is emphasized in the reform.

Modern societies need people equipped with scientific and technological knowledge and skills at the highest level. In this regard, currently, Ethiopia is committed to expand its higher education base and focus on expanding science, technology and engineering fields (MOE & MOCB, 2007). Scientific knowledge, through technology, has had a lot of practical application. The lives we lead today are very different from those of a thousand or even fifty years ago. The knowledge we might gain from science education could help us understand this technical world and live in it successfully (Newton, 2008).

Even though science has great importance, much attention was not given in Ethiopian education system. The competencies of students are unsatisfactory (Ayalew, Dawit, Tesfaye & Yalew, 2009). The poor performance of students in science is attributed to a variety of factors; teacher's methodology; quality of teacher training; quality of curriculum materials; the evaluation methods; shortage of resources; school and out of school environment; teachers knowledge, attitudes of teachers towards teaching science and attitudes of students towards learning science.

The training of science teachers, should equip them with the knowledge and skills that will enhance their ability to provide students with opportunities to learn. In this respect, Hargreaves & Fullan (1993) stated that the deeper knowledge and greater confidence in teaching their subject(s); and being aware of and becoming proficient in new teaching methods like cooperative learning can certainly help teachers increase their pupils' opportunities to learn. Teachers who are skilled and flexible in using different teaching methods and strategies and knowledgeable about the subject matter are capable to improve the achievements of students. In order to achieve these goals it is necessary to get qualified teachers. Teachers are expected to facilitate learning, not merely instruct predetermined facts and knowledge. They have to interpret, apply, adapt and elaborate the curriculum, to address the varied learning needs of pupils (SIDA, 2000).

Recent studies revealed that most teachers in Ethiopia lack not only subject matter knowledge but also pedagogical skill to deliver the subject matter. Most teachers are not well equipped with pedagogical skills. They failed to implement the new curriculum mainly because they had little understanding of the contents and methods of delivering the new curriculum (Derebssa, 2001).

Furthermore, one of the many factors that affect student's performance is the assessment system. Many scholars (Capper, 1996; Nitkon, 1996) indicated that the traditional way of assessing students (giving examinations at the end of terms) doesn't represent the students' overall performance properly. In

addition, written tests that focus on assessing recall of facts or rote memorization may not be appropriate to assess competencies that require performance or practical skills. In relation to this, ICDR (1999:226) clearly stated that:

Judging pupil's ability and performance by administering one test at the end of a term, course, or semester is not advisable and will not be free of errors.

So, experts in the area come with the concept of continuous assessment.

Assessment is an integral part of teaching and learning process, and can be used at different stages in the provision of instruction. This means that assessment and teaching methods have a strong relationship. Supporting this, the ministry of Basic Education and Culture of Namibia expressed their relation as:

Like a design that is woven in to a fabric by a weaver, instruction and assessment are seamless. They are part of the teaching process and one naturally leads to the other (MOBECN, 1999:7).

Hence, effective teaching is inseparable from good assessment because of the interrelated nature of assessment and instruction method. Supporting the above idea the Teacher Education System Overhaul (TESO) document stipulates that Ethiopian's system of teacher education has been poor and thus needs a basic paradigm shift both in teaching learning process and the assessment techniques (MOE, 2003). Thus, the main focus of this study is to assess the practice of student-centred methods and continuous assessment techniques in teaching science in selected Oromia Teachers' College.

1.2 Statement of the Problem

Recruitment, training, professional competency, and poor working conditions of teachers contributed a lot to the crisis of education system in Ethiopia (MOE, 1994). Thus improving quality of teachers is identified as a corner stone to improve standard of the country's education system.

Supporting the above, Yalew (2004) argued that in any school setting, teachers play a paramount role in students' learning. No matter how good the curriculum may be and how well it is organized, and whether or not teaching materials are available, ultimately the quality of education rests mainly on the methodology of instruction employed by teachers.

Several research findings pointed out that, teachers in primary schools are not competent enough and they usually employ the traditional teaching methods (ICDR, 1999). Teachers use chalk and talk method of teaching in which the teachers are active and students are passive. This forces the students to rote memorization of information and facts from their textbook and notes. This was considered to be the most effective method of teaching even though, it results in serious knowledge deficits of students in science beginning from the lower grades (Ayalew et al., 2009).

In the contemporary thought, schools are not considered as places where information is imparted, and learners get only fractions of knowledge. Rather students are becoming active in acquiring knowledge and skills of various natures by their own using student-centered methods of teaching. Regarding this Leu (2000) stated that, the young learner learns best when he or she can associate what is being learned with his or her own life and this makes learning meaningful.

Moreover, the present society is one in which the application science is increasingly important to both individuals and nations. However, as Urevbu (1987) cited in Temechegn (2000) the teaching of science in most African countries concerned more with information (facts) than application of scientific facts (knowledge) in daily life.

To attain the goal of developing students' knowledge in science courses, teachers should have adequate knowledge about the science courses and how to teach it, which include subject and pedagogical knowledge as well as linking it to life problems. The foundation for science education is laid during the pre-

service education. This period should also prepare prospective teachers to develop their own teaching skills and subject matter knowledge so as to be effective teachers after graduation.

The major role of teachers college is to bring change in trainees or produce quality teachers. So, they could determine their degree of success by making regular assessment of their trainees learning. With regard to the quality of trainees MOE (1994) explains that teacher to be effective in their profession; they need to possess the professional skills, knowledge and attitude that make them effective in their assignment. The highest quality teachers, those most capable of helping their students learn, have mastery of both their subject matter and pedagogy. "...the strength of an education system is, for the most part determined by the quality of teachers" (Ayalew, 1991:109). However, Ajeyalemi (1990) in Temechehn (2000) argued that most of the graduates from the system in African countries can only read and memorize scientific information but are not be able to think in, and do in science as their counterparts in developed countries.

In Ethiopia, teachers colleges can meet the demands of the country if they cultivate teachers who can teach students to solve developmental problems, provide services that can enhance the economic, social, political and educational developments. Any organization that graduates students with little or no competence in the fields they are trained for, unable to meet the goals, missions and visions, will be doomed to failure (Ayalew et al., 2009).

To strengthen the educational development, the ministry of education has clearly identified the student-centered method in general objectives of teacher's education in Ethiopia. Some of the general objectives related to student-centred method in teachers' education include:

- Producing teachers who are academically qualified, professionally skilled and ethically committed to their profession.
- Preparing teachers who can confidently promote active learning and the development of problem solving skills through learner-centred

approach using a curriculum where content and methods are integrated.

- Equipping teachers with knowledge and ability in classroom management which fosters constructive student inquiries and interaction.
- Preparing teachers who can select and use appropriate teaching materials, choose and produce and make use of local resource to enrich student learning (MOE,2003)

However the teaching-learning process in most schools in Ethiopia has persisted to be teacher dominated. Most classes are characterized by a situation where students are made to listen to their teacher and copy notes from the blackboard. Learning by doing, problem solving, cooperative learning and group approaches are rather limited (Leu, 2000).

The instructors teaching in colleges themselves are not practising what they are teaching the prospective teachers to apply in their classrooms after graduation. Supporting this Wallace & Loughran (2003) stated that, it is common for teachers to fallback on their own experiences as high school students and teaches in the way they were taught (Wallace & Loughran, 2003).

The writer of this study noticed the problem while he was in Robe Teachers College. He perceived a problem in implementation of student-centered approach and continuous assessment techniques in the teaching learning process of science as recommended in modules. It seems that instructors lack the necessary knowledge and skills during their training in different universities. This felt problem initiated the writer to study the application of student-centered methods and continuous assessment techniques in teaching science in the selected Oromia Teachers' Colleges.

Despite the presence of the problem, previous studies on these issues are not contextual to investigate the problem. Thus, this study attempts to investigate and seek answer to the following basic research questions:

1. What is the current status of the use of student-centered methods in teaching science in Oromia Teachers Colleges?
2. What is the current practice of continuous assessment techniques in teaching science in Oromia Teachers Colleges?
3. Do the practiced teaching methodologies and assessment techniques address the curriculum objectives of science?
4. What are the challenges encountered in the application of student - centered methods of teaching and continuous assessment techniques in teaching science in these colleges?

1.3 Objectives of the Study

The main objective of the study is to determine the status of student - centred methods and assessment practices in teaching science at, selected Teachers' College in Oromia. The study tries to:

- Explore methods of instruction and assessment techniques currently implemented by science instructors in these colleges.
- Assess whether teaching methods and assessment practices match with policy and curriculum objectives of teachers education colleges.
- Examine the challenges/problems in practicing student – centered methods and continuous assessment techniques.

1.4 Significance of the Study

It is proved that the student-centered methods of teaching and continuous assessment prepares the students to solve problems, makes them creative and use information from their environments. Based on this notion, assessing the practice of student-centered methods and continuous assessment and identifying the major factors that hinder or facilitate the application of the student-centered methods and continuous assessment techniques in the teaching of science is important.

Therefore, the result of this study may have the following significance:

- ✚ Initiating the science instructors to improve their teaching methods and assessment techniques
- ✚ Giving insights in to the problems hindering effective practice of student-centered methods and continuous assessment in teaching science for the concerned bodies.
- ✚ Initiating the authorities of the colleges and other concerned bodies that are responsible for implementing the policy, to create conducive working environment for proper application of student-centered methods and continuous assessment.
- ✚ The results of this study might serve as a starting point for further broad and detail research in similar areas.

1.5 Delimitations of the Study

The study associated with the practice of student - centered teaching methods and continuous assessment techniques are deeper and wider in their very nature. It may produce a good result, if the study could include teachers college in different settings of the country. However, to make the study more manageable and to complete within the available time it is restricted to Assela, Robe and Sebeta Teachers College.

1.6 Limitations of the Study

Some of the instructors were not willingness to be observed in the classroom while teaching. In addition, some of the instructors were not cooperative to complete the questionnaires on time. However, the researcher tried to create awareness about the purpose of the study then after the respondents were motivated to respond and the writer has made a lot of effort to bring the paper to its complete form.

1.7 Definitions of Key Terms

Assessment: Assessment is the process of collecting, synthesizing and interpreting information to aid classroom decision making.

Continuous Assessment: An assessment approach which should depict the full range of sources and methods teacher use to gather, interpret and synthesize information about learners, information that is used to help teachers understand their learners, plan and monitor instruction and establish a viable classroom culture.

Instruction: Refers to any deliberation in the teaching learning process which is intended to promote the learning of students in formal settings.

Method: An overall plan in the systematic presentation of knowledge based upon a selected approach.

Passive-learning: Learning in which the learner has purely passive role, receiving information from the teacher with out taking active part in teaching-learning process.

Student-centred Method: Teaching and learning focused the students' experience, needs, interest and abilities.

Class-size: Refers to the number of students assigned to and enrolled in a specific class.

Attitude: Refers to a tendency to respond positively; that is favourably or negatively; that is unfavourably

1.8 Organization of the Study

The study consists of five chapters. The first chapter deals with the introductory part of the study that comprises background of the study, statement of the problem, objectives of the study including basic questions to be answered, significances, delimitation and limitations of the study, as well as

operational definitions of some important terms. The second chapter focuses on the review of the related literature that provides a conceptual framework of the study. The third chapter treats the design and methodologies employed to conduct the study. The fourth chapter provides data presentation, analysis and discussions. Finally chapter five presents brief summary of the findings and conclusions followed by recommendations.

CHAPTER 2: REVIEW OF THE LITERATURE

This chapter sets up the theoretical framework that grounds and guides this study. It represents a review of literature related to the elements that support a successful teaching of science through student- centered method and using varieties of assessment practice. Specifically the following topics are considered: (1) Philosophical views of instruction, (2) Science education, (3) The methodology of instruction, (4) Methods of teaching science, (5) Science teachers in student- centered method, (6) The concept of assessment, (7) Assessment in science, (8) Science education in Ethiopia, (9) Factors affecting the application of student- centered methods and continuous assessment practice. The research related to the above mentioned elements will be described with a view to addressing how they can be incorporated in the classroom to support the learning of science through student- centered methods.

2.1 Philosophical Views of Instruction

In order to effectively implement any instructional methods in the teaching-learning process, educational professionals in general have responsibility to understand the philosophical assumption (paradigms) on which it is based (Leu, 2000). A comprehensive discussion of the underlying approaches is far beyond the confines of this study. However, it is imperative to orient one self in these matters so as to provide some insights about their implications to the teaching-learning processes in general and methods of teaching in particular.

Instructional methods are usually of two types. They are the teacher-centered and student-centered method. Teacher-centered and student- centered practices are often viewed as representing opposite ends of teaching philosophy spectrum, the positivist and constructivist philosophy. The teacher-centered practices said to have an underlying positivist philosophy while student-centered approach is grounded in the constructivist philosophy.

2.1.1 Positivist Approach to Teaching and Learning

Positivism has dominated the field of education for several years. In the positivist approach, knowledge is fixed, and the goal of teaching is to transmit such a commodity to student (Arseneau & Rodenburg, 1998). Knowledge is thus centered on the teacher, who transmits it to students, who passively consumes it. Similarly Long (2000) states that, with in a positivistic tradition, the learner is seen as relatively passive, simply absorbing or memorizing facts or information transmitted by a didactic teacher. He also describes that these pieces of information are usually taken from the academic disciplines, for the purpose of repeating them. According to this philosophical view, there is less emphasis on linking facts and making a coherent and meaningful whole. Often, just memorizing the facts is sufficient and thought to be successful learning. The teacher's task is to repeat or give these prescribed pieces of information from syllabus or books as efficiently as possible.

2.1.2 Constructivist Approach to Teaching and Learning

The constructivist philosophy, according to Vygotsky (1978), states that knowledge is produced or made meaningful through interaction between the learner and the world around him or her. This interaction leads to interpretation, understanding, not just memorization. The world is not seen as being made up of fixed facts. Constructivists view knowledge as unstable depending up on the interpretation of the observer or learner. For them, knowledge is something unified, coherent and interrelated rather than being made up of separate bits and pieces of information (Leu, 2000).

Constructivists believe that knowledge is not a thing that can be simply given by the teacher at the front of the room to the students in their desk. Rather, knowledge is constructed by learners through an active mental process of development that makes them the builders and creators of meaning and knowledge. In this approach, the task of the student is to interact with the world around him/her, to understand, think critically, make linkage, interpret, analyze, draw conclusions and communicate about what he/she is learning,

not just to absorb and accurately repeat information (Woolflok, 1993). In the same way the teacher's task is to use classroom teaching methods that encourage students to be as active as possible by analyzing and interpreting knowledge through the use of problem based learning, project-based learning, discovery learning, collaborative learning (Leu, 2000).

From the above discussion and views of different scholars one can understand that positivism stresses on the traditional transmission of knowledge from the teacher to the students which is usually called 'chalk and talk' method of teaching. On the other hand, constructivism makes students how to work together to solve problems through active learning strategies. The teacher functions more as a facilitator who coaches, mediates, prompts, and helps students develop and assess their understanding by their learning.

Generally, constructivist views of learning can be summarized as learners construct their own understanding; new learning depends on current understanding; learning is facilitated by social interaction and meaningful learning occurs within authentic learning tasks.

2.2 Science Education

Science is seen as functional in preparing both a body of future scientists who can play a key role in the development of the national economy and having the boarder purpose of developing scientifically literate citizens.

Science education is concerned with the developing of technologically literate citizens who understand how science, technology, and society influence one another and who are able to use this knowledge in their every day activities. Reinhertf & Beach (1997) state the rationale of science education as follows; A study of science is important because it has the potential for improving the quality of life and making the world safer, empowers people, giving them grater control over heir lives by providing path ways for finding answers to questions, taught in school for the betterment of society and the discovery of new technologies and economic benefit of their application are often the focus of

bolstering science education. Supporting the above, Wallace and Loughran (2003:25) argue that the purpose of teaching science should not be just to teach knowledge for future classroom studies, but should be more relevant to the students' lives outside the classroom so that they can "think through issues that they are going to face".

2.3 The Methodology of Instruction

There can be no teaching learning process without the systematic selection and application of methods and techniques in the overall strategy of implementing curriculum. An individual reviewing written material on the area of instruction could come up with varied classification of instructional methods, such as teacher-centered Vs student-centered methods, direct instruction Vs indirect instruction, conventional Vs non-conventional methods and traditional Vs modern methods of instruction. Out of the aforementioned classifications of instructional methods, the most popular and dominantly used by many educators is the teacher-centered Vs the student-centered instructional methods.

2.3.1 Teacher-Centered Method

An approach dominated by teachers; places the teacher at the center of learning and can result in passive behaviour on the parts of the students. The teacher is considered as the source and the student as a recipient. The learning process depends on the talking of the teacher where the learner becomes a passive listener. Moreover, it inhibits active participation and research ability of the learner and encourages him/her to be submissive. Being dominated by teachers lecture, the teacher - centered approach creates many problems to learners. For instance, Silberman (1996) confirmed that during lecturing students' attention decreases with each passing minute. As lecturing appeals only to auditory learners, it tends to promote lower level of learning of factual information. When learners are passive receivers and the focus is on factual information, they learn what is told by the teacher usually without curiosity, without questions and with less interest for inquiry.

In teacher - centered methods, the emphasis is on theory rather than practice and the successful students are those who can display their knowledge of the facts that have been fed in to them. Strengthening this, Lue (2000) stated that, in this kind of education there is little time for practical activities, discussions, group work, experiments or other alternative methods. Since the emphasis is on memorizing the maximum amount of information, there is no time for activities. Moreover, Plass (1998) indicated that, the role of students in teacher-centered approach is to demonstrate their power of memory and not their skills in processing that knowledge.

2.3.2 Student-Centered Methods

As opposed to teacher-centered model, the student centered approach is advocated to teach children any subject (Knowles, 1980, Frier, 1972). In this approach students have a chance to interact, to discuss, to debate and ask question, explore, experiment and observe their own knowledge through active participation.

The underlying assumption here is that learning becomes meaningful when learners use it and relate it with their lives. Regarding this Aggarawal (1995) noted that whatever students learn in educational institutions is useful only when they can apply the same in everyday life.

Research shows that the teaching guided by a student-centered perspective can enhance students' motivation to learn and, more important to their actual learning and performance (Deci & Ryan, 1991).

According to Temechegn (2001) learning in a student-centered method setting is not purely individualistic. Rather, students learn through cooperation, active involvement and participation. The central issues of student-centered instruction are methods of teaching which fosters reflection, autonomy and active learning. Student-centered methodology emphasizes the process rather than the product, and is activity-based on different teaching strategies.

2.3.2.1 Characteristics of Student-Centered Instruction

Brandes and Ginnis (1986) characterize student-centered instruction as learner seating together instead of in rows, learners freedom to participate or not, participatory decision making where both students and the teacher together formulate learning objectives, select contents and methods and evaluate learning progress. Moreover, Temechegn (2001, Vol.1) pointed out the characteristics of student-centered instruction as: teaching not confined to classroom base, integrated subject matter, active pupil role, learning predominantly by discovery techniques; external rewards and punishments not necessary i.e. intrinsic motivation, not too much concerned with conventional academic standards, little testing, accent on cooperative group work, creative expression and process is valued.

2.3.2.2 Rationale of Student-Centered Methods of Instructions

Brandes and Ginnis (1986) identified different rationales of student-centered methods of instruction.

- Ensures learners preferences, needs and interests. It avoids a loss of superiority and inferiority; it creates democratic ways of doing things, mutual respect, and equalitarian relationship between the teacher and students themselves.
- Allows every learner to interact, value, views and opinions aired by learners.
- Ensures self fulfilment i.e. development of cognitive, affective and psychomotor (skills).
- Enhances the release of learners' creative potential.
- Can enable the learner to acquire skills and attitudes which help them to live as a useful member of the community because this method of instruction focuses on practice and active methods of learning.
- Helps the teacher to contemplate and provides a wider alternative teaching learning method and techniques and teacher's improvement of his professional knowledge and skills (Brandes and Ginnis, 1986).

2.4 Methods of Teaching Science

As Barnes, (1992) cited in Wallace & Loughran (2003) states the notion that science teaching in teacher-centered is that the prime belief driving the organization of pedagogy concerns the delivery of subject matter. A teacher with such a mindset may plan lessons based on a sequence of content while beliefs about how students learn or the resource needed became a secondary concern. This approach is common among primary science teachers because their pedagogy is often dominated by a perspective curriculum that puts pressure on them to cover a large amount of specific content (Wallace & Loughran, 2003). However, Wittrock (1994) argues those conventional methods of covering the subject matter and presenting only scientists' View of scientific phenomena clearly do not effectively teach science to all students.

Alternatively, teaching which is described as student-centered primarily focus on how students learn, thus taking into consideration students' prior knowledge on the structuring of social interaction with peers and the teacher (Wallace & Loughran, 2003). One of the best means of helping children know the world at hand is to organize materials so that they can explore, question, reason and discover, answers through their own physical and mental activity. Science teaching involves teaching students to use their knowledge, beliefs, and Meta cognitive and affective thought processes to generate new, fruitful, and transferable conceptions that have personal and every day meaning and significance (Wittrock, 1994).

Thus, effective science teaching to leave students with the ability, and the motivation, to solve problems scientifically and to carry out scientific investigation, develop self confidence, ability to work honestly and cooperatively. Effective instructional strategies involve knowledge of multiple methods or activity sequences that lead to successful student learning and a specific concept or process skill (AAPT, 2009).

2.4.1 Constructivist Approach in teaching Science

Constructivism is probably the most widely accepted theory among science educators (Irzik & Nola, 2005). In the last two decades constructivism represents a paradigm change in science education.

The term constructivism has attracted numerous modifiers, and two of these stated by Williston & Taylor (2006) are of interest here:

i. Personal Constructivism

The learners construct understanding of natural phenomena which is a weak form of personal constructivism and construct their understanding of natural phenomena by reflecting not directly on the world itself but on their experience of the world, and so their resultant knowledge can be judged only in terms of its viability, or degree of fit with their experience which is the stronger form of personal constructivism.

ii. Social Constructivism

In science education, social constructivism has enriched students' pedagogical perspectives on classroom learning by promoting the importance of engaging students in dialogical activities, including collaborative learning and consensus building (Williston & Taylor, 2006). To learn science from a constructivist philosophy implies direct experience with science as a process of knowledge generation in which prior knowledge is elaborated and changed on the basis of fresh meanings negotiated with peers and teachers.

According to Watts (1994) constructivism, provides opportunities to explore and elaborate pupils naive and developing understanding of science; promotes active learning and actionable learning-where pupils must put their understandings into practice and use their knowledge; engenders shared team work and collaborative group activity with in an overall social context; works through the use of open-ended investigations, makes science relevant, enjoyable, fruitful, plausible and highly motivating.

2.4.1.1 Cooperative Method

Teaching in a cooperative method required students to make measurements, communicate, interpret data, read graphs, and design experiments. These skills will enhance by exchange of ideas and discussion in the cooperative groups.

In cooperative teaching, the class consists of students working in small groups rather than as individuals. According to Bruner (1996) Cited in Sidawi (2005:93) the mind “is not only active in nature, but it seeks out dialogue and discourse with other active minds. And it is through this dialogic, discursive process that we come to know”. Moreover Vygotsky (1978) argued that “developmental processes ... operate only when the child is interacting with people in his environment and in co-operation with peers”. Teachers have a responsibility for setting the stage and working with students, but students work in groups rather than as individual. According to Jonson, Holubec, & Roy (1984) cooperative teaching has: face to face interaction, positive interdependence, and individual accountability, interpersonal and small-group skills. Generally in cooperative learning students must be taught effective means of working together and discussing how well their groups are working to achieve their goal.

2.4.1.2 Discussion Method

This kind of teaching requires students to find their own concepts, principles and solutions, not to adapt them from a teacher or text book. Discussion involves learners in task-centered talking, as well as, being an enjoyable activity in itself. This provides huge opportunities for learning. Students get a chance to practice high-order mental skills such as creativity, evaluation, synthesis and analysis (Petty, 2004).

According to Solomon (2005) in science education discussion is used for negotiations before and during practical work; estimation of alternative ideas with the class about a particular topic; demonstration to pupils of different interpretations of experimental evidence; expression of values relating to social

issues; exploring the reception of knowledge from television and other informal sources.

2.4.1.3 Discovery Method

Any teacher who is capable of maintaining classroom atmosphere with warmth, acceptance, and nourishment has basic qualifications for young children in discovery science. A positive attitude towards science and the ability to carry out consultants and facilitator roles are needed for good teaching in discovery method. Describing how students could learn science using discovery approach, Nanda (2002) stated that, this approach stresses the learning of concepts, theories and contents in science through discovery rather than through rote memorization.

Moreover, Hudson (2005) argues that discovery learning, where pupils are given a lot of responsibility for finding out knowledge requires a great deal of processing and analysis. In addition, participation and ownership of the learning experience can be very motivating. Pupils can very quickly become adapt at carrying out research into topics and reporting back to their peers.

2.4.1.4 Project Method

The project provides the challenges which induce personal commitment to the problem working through the investigation, at the level according to students' own potential, will present them with a sense of personal achievement. Woolnough (1994) argues that the best method of effective science teaching is through student research projects, in which students take a problem of personal concern to themselves and tackle it, worry at it, preserve in it and meet its challenges, producing their own solution. This approach produced a cloth contact with real life situations, encouraged cooperation in between or among learners, offered a leadership role to play (Squazzing & Green, 1998).

As mentioned by Woolnough (1994) the student research project has the following characteristics:

- The prime motivation for the work will come from the student.

- The student will have considerable amount of autonomy and independence.
- The project is open-ended, with no single 'right answer'.
- The project is difficult enough to provide a challenge for the student.
- It entails working with one or more other students.
- It builds on the student's existing knowledge and also information gained by personal research.
- It provides a successful and satisfying outcome for the student (Woolnough, 1994:53).

2.4.1.5 Problem Solving Method

In problem solving, pupils have implicit theories-in-action about how things work. They are not always asked to verbalize these but in order to reach a solution they must realize and give expression to their theories in some deliberate ways. Supporting this Newton (2008) states that problem solving is an approach that presents what is to be learned as a scientific problem, possible solutions (usually possible explanations) are generally investigated practically. The central virtues of problem-solving rest on its potential to both facilitate the construction of knowledge and its transfer of learning from one context to another, and to encourage the transfer of responsibility for learning from teacher to learner. The classroom environment of problem - based instruction is student-centered and encourages open, equity and freedom of thought (Lue, 2000).

According to Petty (2004) problem-solving process is represented by the following cyclical steps: Identify the problem → research the problem → develop possible solution(s) → select the best possible solution(s) → construct a prototype test and evaluate the solution(s) → communicate the solution(s) → and overhaul the solution(s) based on information gathered during the tests and presentation.

2.4.1.6 Practical Activity

The purpose of the practical work is to implement the knowledge the students have acquired in the classroom studies and to train them in independent experimentation. The laboratory offers many more opportunities for satisfying natural curiosity, for individual initiative for independent work, for working in one's own time and for obtaining constant feedback regarding the effects of what they have been doing. In regular classes students attention may easily be diverted from the learning tasks, while the concert nature of laboratory work helps students focus their attention on the task at hand; even in case of diversion their attention can readily be regained (Tamir, 1991).

Rationale for the School Science Laboratory

1. Science involves highly complex and abstract subject matter. Many students would fail to comprehend such concepts without the concrete props and opportunities for manipulation afforded in the laboratory.
2. It gives students an opportunity to appreciate the spirit of science and promotes problem-solving, analytic, and generalizing ability.
3. Practical experiences are essential for the development of skills and strategies with a wide range of generalisable effect.
4. The laboratory has been found to offer unique opportunities conducive to the identification, diagnosis and remediation of students' misconceptions.
5. Students usually enjoy activities and practical works, and when they are offered and give a chance to experience meaningful and non-trivia experiences they become motivated and interested in science (Tamir, 1991).

Table 1 – Levels in Inquiry in the science Laboratory

Level of inquiry	Problems	Procedures	Conclusions
Level 0	Given	Given	Given
Level 1	Given	Given	Open
Level 2	Given	Open	Open
Level 3	Open	Open	Open

Source: practical work in school science (Tamir, 1991)

Teaching in the laboratory requires a special approach to science, for example, special instructional skills (running discussions before and after laboratory work), special management skills (budgeting time, managing small groups, guarding safety), special attitudes (Patience, tolerance of uncertainty, readings to encounter failure, open-mindedness), and the ability to integrate the laboratory with other instructional strategies and to motivate students will (Gott, Mashiter, 2005).

2.4.1.7 Role Play

The role play is used to enable students better to perceive an alternative perspective on a controversial issue in science. The role could be a scientists, an environmentalist, a local farmer in order to better understand the dynamics of science in a social context (Hiotics, 1993), in (Aubusson & Fogwill, 2006). Students may be physically involved, for example, by “walking around in such a manner that the direction is analogous to the motion of electrons, through a wire” (Aubusson & Fogwill 2006:293).

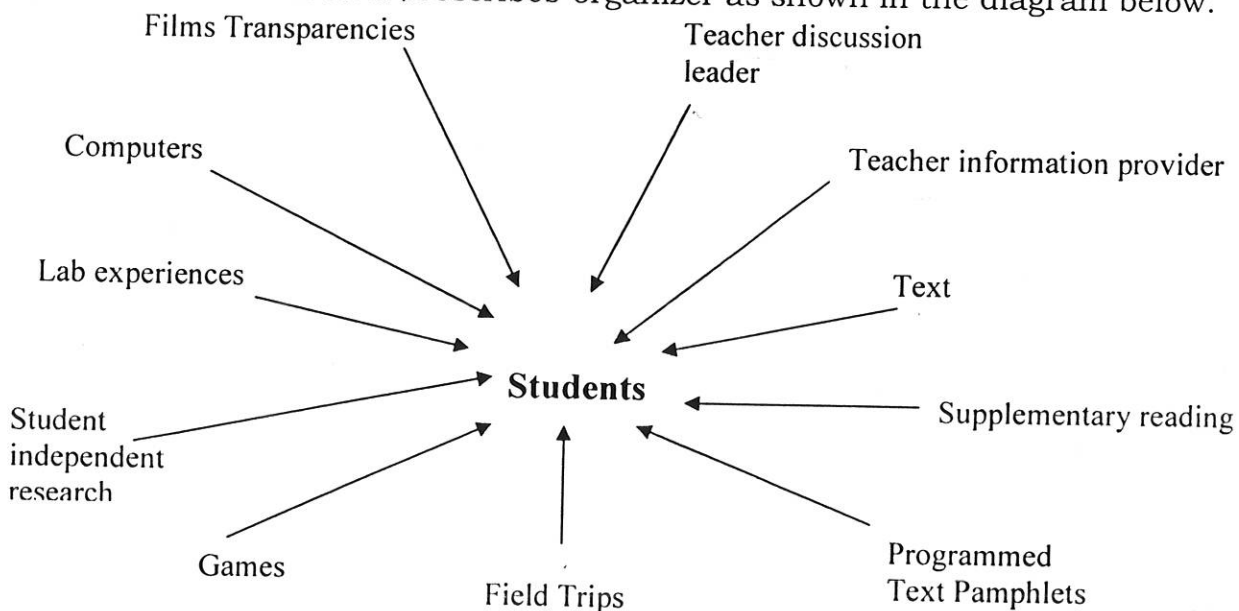
The potential advantages of role play have long been recognized. According to Ladrousse (1989) cited in Aubsson & Fogwill (2006) role play: encourage students to create their own reality; develop students ability to interact with other people; increases students motivation; help build up students self confidence; allow students to bring their experiences into the classroom; have fun; help to identify misunderstanding; and Provide shy students with a mask allowing greater participation.

2.5 Science Teachers in Student – Centered Method

In many countries primary teachers' background knowledge in science is very variable with the effect that they lack confidence and competence in teaching science (Goodrum, Hackling & Rennie, 2001) (in Pell & Jarvis, 2005). Teachers with low confidence cope by teaching only the minimum required; stressing aspects they do feel more confident in such as physics; using perspective texts; underplaying questioning and discussion; and only doing very simple practical work.

Nowadays science teachers have to face an endless struggle between the vast number of topics that must be taught and the need to develop independent learners who master a variety of high order skills, namely, learning skills, thinking skills, and inquiry and problems solving skills (Eylon, Scherz, & Spektor-Levy, 2005). A major goal of science instruction in schools is to prepare students for life in a world of rapid scientific and technological change, rather than to prepare a small number of students for high specialized scientific career. Effective science teachers who view student learning as the end goal and teaching as a purposeful means to help all students learn.

Singh (2005) states that model of effective teaching places the students in the center completely surrounded by multi sensory media arranged by the teacher who functions as a prescribes-organizer as shown in the diagram below.



An excerpt from Teaching of science (2005)

The classroom of a qualified science teacher is an active learning community where students, work in groups conducting meaningful experimental investigations; build and test scientific explanations; engage in thought provoking activities; and conduct inter-group discussion and evaluation of each other's arguments (Wallace, 2007)

Teachers should employ teaching strategies that help learners recognize conflicts and inconsistencies in their thinking, as these experiences catalyze the construction of new, more coherent knowledge.

Effective science teachers use these approaches to ensure that students are actively constructing their learning:

- Present science as a process of constructing and empirically testing models for their ability to explain and predict.
- Devote time to diagnosing learners' alternative conceptions.
- Employ a repertoire of teaching approaches that range from open and guided inquiry to direct instruction.
- Use teaching strategies and assessment formats that are consistent with the goals of the lesson.
- Use teaching strategies that help learners become aware of inconsistencies in their thinking.
- Use teaching strategies that raise students' awareness of how they construct knowledge together and as individuals.
- Teach with strategies and techniques that help learners become active thinkers.
- Employ discrepant events to engage learners with concrete phenomena, activate their interest, and help them become aware of the conflicts between their thinking and accepted scientific concepts.
- When determining the order in which to introduce science concepts in a given domain, consider the ways those concepts are interdependent.
- Use teaching strategies that include familiar analogies, metaphors, and physical models to guide learners toward accepted scientific concepts.

- Adapt available curriculum materials and teaching strategies to fit the diverse needs of all students.
- Organize cooperative student learning groups that reflect intellectual, gender, and cultural diversity.
- Conduct frequent assessments as a seamless part of teaching and use the results to modify instructional experiences for groups and individual learners (Staver, 2007:15-16).

In order to be effective in their teaching the science teachers knowledge base consists of three components content knowledge, pedagogical knowledge, and pedagogical content knowledge (Shulman, 1986; Etkina, 2005) in (AAPT, 2009).

2.6 The Concept of Assessment

According to Njabili (1995) assessment is the process of collecting, synthesizing and interpreting information to aid classroom decision making. Assessment includes all methods and procedures that teachers use to collect information on what is happening in their classroom and the effect it has on learners' achievement. Supporting this Chailore et al., (2003) cited in Desalegn (2004) states that assessment is a way of observing, collecting information and making decision based on information. Good assessment of student learning provides valid and reliable evidence of student performance to take appropriate decision.

2.6.1 Types of Assessment

Miller & Linn (2005) lists the types of assessment with their descriptions as follows:

- a. Placement assessment: determines prerequisite skills, degree of mastery of course goals, and/or best mode of learning.
- b. Formative assessment - determines learning progress, provides feedback to reinforce learning, and correct learning errors.
- c. Performance assessment - refers to student's engagement in tasks that require students to be active participants such as manipulating materials, demonstrating skills, solving a multistage problem or participating in a debate.

- d. Diagnostic assessment: determine causes (intellectual, physical, emotional, environmental) of persistent learning difficulties.
- e. Summative assessment: determines end-of-course achievement for assigning grades or certifying mastery of objectives.

William (2000) cited in Broadfoot, Weeden & Winter (2002) argued that to enhance pupils' learning, teachers need to find ways to integrate the diagnostic, formative and summative functions of assessment and not be driven by the evaluative function.

Assessment should be an integral part of the educational process, continually providing both 'feedback and feed forward' (Broadfoot et al., 2002). It therefore needs to be incorporated systematically into teaching strategies and practices at all levels.

2.6.2 Assessment Practice in Student-Centered Method

In many classrooms the issue is not that teachers aren't assessing enough, but that they aren't using the information they collect to help pupils learn. Good practice requires an understanding of the reasons for assessment and the systems and structures adopted in the school. It entails regular and purposeful marking of pupils work, consistent and accurate judgments of pupils' attainment; effective use of day-to-day assessment to provide pupils with feedback and to inform the setting of targets, and manageable systems for recording pupils progress (Broadfoot et al., 2002).

Continuous assessment as an alternative to traditional testing of pupils' achievement offers methodology of assessing pupils performance and improving the success of pupils (USAID, 2003; Bolyard, 2003) cited in (Desalegn, 2004). This means that the continuous assessment process is much more than an examination of pupils' achievement.

Table 2: Comparison of the Teacher-Centered and the Student-Centered approach of Assessment

Teacher - centered approach	Student-centered approach
Instructor's role is to be primary information giver and primary evaluator.	Instructor's role is to coach and facilitate. Instructors and students evaluate learning together
Assessment is used to monitor teaching.	Assessment is meant to promote and diagnose learning.
Teaching and assessing are separate.	Teaching and assessing are intertwined.
Emphasis is on right answers.	Emphasis is on generating better questions and learning from mistakes.
Assessment is done directly/indirectly through the use of objectively - scored tests.	Assessment is done directly through papers, projects, performances, portfolios, and various other learning activities.

Source: Proceeding of the conference on teacher education for sustainable development in Ethiopia (Jantus & Mulat, 2006:122).

In student-centered approach, teachers evaluate and grade students' work, but evaluation activities that involve students are included in the process. Students learn how to assess their own work and participate in the evaluation of work done by their peers. These self-and-peer assessment activities develop skills that independent, self-regulating learners need. The traditional educational practice does little to develop these skills and lots to feed the focus on grades. Thus, teachers are encouraged to use a wide range of assessment techniques to track student progress and facilitate future learning.

2.6.3 Purposes of Assessment

Different scholars mentioned the purposes of assessment in different ways but (Nitko, 1996) mention purposes of assessment in general as to:

i. Improve Instruction

Assessment activities tell about the teachers whether what they taught was effective. If learners are learning what is expected it will show in the

assessment. If the assessment show that the learners are not doing well on a particular topic or skill then this tells the teacher must find a new way of teaching the lesson or topic, in turn to improve instruction.

ii. Feedback for students and teacher

Simply assessing students and reporting the results is not likely to affect students' performance. Assessment results should review both correct and incorrect performances of students and in addition, be able to correct student's incorrect performances.

iii. Motivate Students

Students at any level have to be encouraged during teaching and learning process and necessary motivation and follow up system has to be designed and practiced of assessment is very important.

IV. Assign Grades/Summative Purpose

One of the most obvious reasons for giving classroom assessment is to assign grades to students. Although teachers continually assess their students' progress in informal ways, it is necessary for them to "officially" record their evaluation of student's progress through grades (Nitko, 1996).

Because of the Strong relationship of assessment and instruction good teaching is inseparable from good assessment. According to different scholars assessment can influence instruction positively or negatively.

Assessment influences instruction positively when the assessment methods are suitable for particular tasks or content. On the other hand, assessment influence instruction negatively when assessment methods are not suitable for the content. According to Broadfoot et al. (2002), assessment will have a negative impact on pupil learning where:

- The giving of marks and the grading functions are over emphasized, while the giving of useful advice and the learning functions are under emphasized.

- Pupils are compared with one another, because this focuses pupils' attention on competition rather than personal improvement.
- The dominance of the summative function of assessment in many schools has produced benefits for some children but costs for others.
- Teachers are less confident in diagnosing learning difficulties or suggesting actions that may help pupils' learning, than they are in collecting marks that record attainment.

2.7 Assessment in Science Education

Student assessment in science is a necessary and potentially beneficial aspect of science teaching. However, the danger with assessment is that only certain things are assessable and those things tend to acquire undue importance because only they are assessed and reported (Woolnough, 1994).

Research has shown that assessment can influence education. Because of the focus of this study on teaching science through student-centered method, the students should be assessed based on their learning of science. For example, paper and pencil tests can assess only a small part of scientific ability. They are best suited for testing the students' ability to recall facts, concepts, and procedures and to solve short, well-defined problems (Collins, Hawkins, & Frederiksen, 1993) cited in (Sidawi, 2005). Thus, there is a need for multiple tools of assessment.

This includes the ability to employment different methods to assess, both assessment for learning (formatively) and assessment of learning (summatively), student conceptual understanding, acquisition of responding and problem solving skills, and science process skills.

The following are some ways of assessing students in science teaching.

- ✚ Assessing factual knowledge (short answer questions, multiple choice questions, drawing a diagram, labelling a diagram, supplying missing words in sentences, and pairing related items) (Newton, 2008:54).
- ✚ Assessing understanding and productive-thinking (explain in his or her own words; tell you why, provide reasons and justify actions and

assertions, think flexibly; solve new problems and apply what they know in new situations; make predications; think critically and evaluate evidence) (Newton, 2008:55).

- ✦ Assessing practical and experimental skills: Observe measure and record accurately and systematically; follow instructions accurately for the safe conduct of experiment; extract from available information data relevant to a particular context. Use experimental data, recognize patterns in such data, from hypotheses and deduce relationships; raw conclusion from and evaluate critically experimental observations and other data; apply scientific ideas and methods to solve qualitative and quantitative problems (Woolnough, 1994:59).

2.8 Science Education in Ethiopia

The previous curriculum was criticized for lacking relevance, clearly defined objectives and having too much concentration on theoretical knowledge with little concern to everyday life (MOE, 1994). To alleviate this short-coming the policy addressed a major objective: "... make education relevant by providing problem solving skills and all rounded education catering to the need of individuals at all levels" (MOE, 1994:13).

It has identified five general objectives (TGE, 1994:7-8) but, three of them which are listed below were that throw light upon science and technology education as:

1. To produce citizens capable of identifying and solving problems by strengthening individuals physical and mental potential beginning from basic education for all and at all levels.
2. To produce citizens that show positive attitude and contribute towards popularization, dissemination and development of science and technology in society, creativity and experimenting skills.
3. To produce citizens who are capable of knowing, observing and understanding changes and who appreciate the environment by making education appropriate and relevant to environmental and social needs.

These days, the Ethiopian government has given more value to science education. This is evident in the '70:30' plan in which 70 percent entrants to universities are natural science (Engineering and technology, natural and computational sciences, pharmacy and health science, and agriculture and life sciences) students and 30 percent of the students in to the social and humanities streams. The government rationale for introducing this professional mix is the belief that science and technology are the engines of development (Ayalew et al., 2009).

2.9 Factors Affecting the Application of Student-Centered Methods and Assessment Practice

2.9.1 Teachers' Training

The way teachers are trained can strongly affect the whole educational process, particularly the implementation of the student-centered methods. A teacher training is one of the means if not the only to create and develop teaching competencies. International experiences suggest that learning complex skills, such as those required to promote active learning requires proper initial training followed by periodic reinforcement to sustain changes in teaching behaviour (World Bank, 1997).

Thus, to implement the student-centered method properly, a pre-service teacher training becomes very important. If teachers are properly trained and implement the skills they acquire in the professional career, they are likely to influence their students.

2.9.2 Teachers Attitude

The factors related to teachers may include inadequate professional skills, poor subject matter, unfair evaluation and lack of interest in their profession, punctuality, and respect for students. These may result in developing negative attitude, and it becomes difficult to make student-centered method practical.

Positive teachers' attitude exists when teachers have confidence in their ability to teach, and committed to teaching and cooperate with each other. Teachers

are committed to teaching learning and care about their students, when they set high standard of work and behaviour and model them selves. Teachers are co-operative when they plan school activities and teach collaboratively and when they share ideas with each other and when teachers and administrators work together on whole school issues (Heneveld & Craig, 1996).

2.9.3 Students Attitude

For learning to take place effectively and for students to become successful, they should be ready and motivated to learn materials offered by their teachers. Student readiness and motivation refers to the extent to which they are willing to do assignments, and participate in practical projects and other tasks (Ayalew et al., 2009). No learning will take place unless the student is willing and committed. No potential will be realized unless the student responds to a challenge. No matter how good the curriculum, how cognitively correct the teaching methods, unless the teacher is able to motivate his/her students to enthuse about their science and make commitment in it, he/she will have given them little of lasting importance (Woolnough, 1994).

2.9.4 Resource

Social environment of a given educational institution, the location, size, shape and construction of the classroom, the presence and effective management of different instructional facilities like furniture, resource centers, laboratory and library services and computer centers have direct bearing on the instructional methods.

Availability and effective utilization of resource enters managed by skilled personnel, the presence of well organized and managed library which is stacked with latest, varied and sufficient reading rooms with appropriate seating facilities, and the presence of trained person in library science and the presence of laboratories equipped with modern laboratory materials and managed by qualified technicians are important factors for the success of student-centered instruction (Farrnat, 1980).

CHAPTER 3: REASEARCH METHODOLOGY

In this part source of data, samples and sampling techniques, data gathering instruments used and data analysis will be described thoroughly.

3.1 Research Method

The research method employed in this study was descriptive survey research method as it attempts to secure information as they currently exist. According to Gay & Airasian (2000) quantitative descriptive studies are carried out to obtain information about the preferences, attitudes, practices, concerns or interests of some group of people. Thus, this approach enables the researcher to examine the current practice of Student-centered methods and continuous assessment and factors hindering the application of them.

3.2 Sources of Data

Data sources in this study were both primary and secondary ones. Primary data were collected from College academic deans', instructors and students. Moreover observations regarding the classroom facilities, classroom interaction and related matters in the sample colleges were made. Secondary data were collected from recent publications. Relevant books, journals, relevant documents prepared by Ministry of Education and College documents were reviewed.

3.3 Sample Population and Sampling Techniques

The study population included Oromia Teachers Colleges. They are Jimma, Metu, Asella, Robe, Sebeta, Nekemte and Dembidolo Teachers' Colleges. From the seven colleges of Teachers education three of them were selected using simple random sampling specifically lottery method. Thus, the selected teachers' colleges were Asella, Robe and Sebeta.

Regarding the respondents, all science instructors (38) were included in the sample by using availability sampling technique since they are few in number. Because of the total student population of the three colleges is relatively large size (1430); proportional sampling technique employed to include 20% of

students from their respective colleges in proportion to the number of science students and 20% of science students from each college were selected using systematic sampling. The following table summarizes the number of selected sample instructors and students from each college.

Table 3: The Number of Selected Samples

No	Name of Teachers college	Total number of students taking science courses	Number of sample students	Number of science instructors
1	Asella	531	106	14
2	Robe	652	131	16
3	Sebeta	247	49	8
Total		1430	286	38

Source: Respective administration offices of the colleges

3.4 Data Collection Tools

In order to gather information, the researcher used multiple methods of data collection instruments which are believed to open room for triangulation and provide the researcher with ample information. Accordingly, the following instruments were used: Interview with college academic deans, questionnaires for instructors and student-teachers, and observation checklists and document analysis.

3.4.1 Interview

In this study, interview was held to collect information, about the practices of student-centred methods of teaching and assessment techniques of science instructors. Accordingly three vice academic deans were interviewed using structured interview guides.

3.4.2 Questionnaires

Questionnaire is used for its appropriateness to secure data from many people at a time and for its natural characteristics that allow informants express their ideas and opinions freely. Thus, questionnaire composed of both open-ended and close-ended items were prepared and administered.

The researcher prepared two sets of questionnaires. The first were for instructors. It focuses on the design and implementation of different teaching methods and assessment techniques and related factors. It was conducted in English.

The second questionnaire which focuses on how instructors apply different teaching methods and continuous assessment techniques and its benefits was prepared for students in English and translated in to 'Afaan Oromoo'.

3.4.3 Classroom Observation

This was used to see the extent to which science instructors employ student-centered teaching methods and continuous assessment techniques in their classrooms to cross-check the responses of the instructors and their practices in the classroom. It was also used to check availability of facilities and resources.

3.4.4 Document Analysis

Attendance sheets, mark-list, and reporting sheets were inspected to see the practice of assessment techniques. In addition documents prepared by ministry of education and oromia education bureau were reviewed.

3.5 Procedures of Data Collection

Both the questionnaires and interviews included in the study were prepared based on the basic questions and review of related literature. Pupils' questionnaires were finally translated into Afan Oromo, which is the medium of instruction of the study area. The language translation was done by Afan Oromo graduate students at Addis Ababa University. Before the questionnaire was administered to respondents; a pilot test was carried out in Robe Teachers College to ensure the language clarity and appropriateness of the items. Based on the above views the pilot study was conducted with 10 students and 3 instructors which were later excluded from the study. Finally, modifications were made depending on the comments collected during tryout. At last, this questionnaire was set in their final forms. To maximize the quality of the

responses and the rate of return the time convenient for the respondents were arranged. A brief orientation about the whole purposes of the study was given for the respondents. A close follow-up was also made to correct problems that arose during the filling of the questionnaire and the distribution and collection of questionnaires were done in collaboration with two instructors in each college.

3.6 Methods of Data Analysis

After the questionnaires have been returned from respondents, data gathered from respondents were tabulated in such a way that it describes the characteristics of respondents and percentage of the responses of the given items.

In addition to this, chi-square at 0.05 alpha level of significance and mean value were employed to determine the opinion difference between the responses of the sample groups.

CHAPTER 4: PRESENTATION AND ANALYSIS OF DATA

This part of the thesis deals with the presentation and interpretation of the data gathered from the sample colleges in line with the objective of the study.

Accordingly, presentation and analysis were made by making use of the data gathered from three college students, instructors and academic deans. Four tools were used to gather data. These were a set of questionnaire including both close-ended and open-ended questions, interview guides, document analysis and observation. From a total of 286 questionnaire distributed to students, 262 and of 38 distributed to instructors, 33 were properly filled and returned. Like wise prepared structured interview guide questions were presented to 3 academic deans, all of them have responded to the questions, teacher's mark-list, reporting sheets and attendance sheets were analyzed and observation of the sample colleges regarding teaching methods, assessment techniques, class-size, availability of facilities and other related factors were made.

Therefore, analysis and interpretation of the data were made based on the responses obtained from the respondents, document analysis and observation check lists.

4.1 Characteristics of Respondents

Description of the characteristics of the target population gives some basic information about the sample population involved in the study. Thus, the following table (Table 4) contains about the general characteristics of respondents involved in the study.

Table 4: Characteristic of the Respondents

No	Characteristics	Respondents					
		Academic deans		Instructors		Students	
		No		No	%	No	%
1	Sex						
	Male	3	-	33	100	142	54.2
	Female	-	-	-	-	120	45.8
2	Academic qualification		-				
	MSC/MED	3	-	9	27.3	-	-
	BSC/BED	-	-	24	72.7	-	-
	Diploma	-	-	-	-	-	-
	TTI	-	-	-	-	-	-
3	Age/years (students)		-				
	<16	-		-	-	-	-
	17-19	-	-	-	-	215	82.1
	>20	-	-	-	-	47	17.9
4	Work experience (in years)		-				
	< 5	-	-	4	12.1	-	-
	6-10	-	-	14	42.4	-	-
	11-15	-	-	6	18.2	-	-
	16-20	3	-	5	15.2	-	-
	21 and above	-	-	4	12.1	-	-
5	Contact hours		-				
	< 5	3	-	2	6.1	-	-
	6-10	-		7	21.2	-	-
	11-15	-	-	6	18.2	-	-
	16 -20	-	-	16	48.4	-	-
	>21	-	-	2	6.1	-	-
6	Years/students		-				
	1 st year	-	-	-	-	191	72.9
	2 nd year	-	-	-	-	71	27.1

From the data collected and tabulated, the following significant characteristics of the respondents have been obtained.

According to the personal details shown in table 4, all academic dean respondents and all the instructors were males. This showed that there is no female participation in the teaching of science and college leadership in the colleges under study.

Regarding qualification, a large proportion of the instructor respondents 72.7% were BSC/BED and 27.3% of the instructor respondents had MSC/MED degree and all the academic deans had MSC/MED.

When we see the services of instructors and academic deans 12.1% of the instructors have served between 1-5 years, 42.4% have served 6-10 years, 18.2% have served 11-15 years, 15.2% have served 16-20 years and 12.1% of them have above 20 years of service. All the academic deans have above 16 years of service. From the above description, it is possible to say that the majority of instructors are at the active working age group.

Regarding the student respondents, as it is indicated in table 4, 142(54.2%) of the respondents were male. The rest 120(45.8%) of them were females. This shows that females' participation in colleges of the study area is proportional to male respondents. Regarding their age majority, 215(82.1%) of them were between 17-19 years of age and only 47(17.9%) of the students were ≥ 20 years of age. It seems most of the students began the first grade at appropriate age.

Regarding their educational level, 191(72.9%) were 1st year students and 71(27.1%) were 2nd year. The percentage of the students was large for 1st year due to the low number of population of 2nd year students.

Table 5: Instructors Teaching Load (periods)

≤ 5		6-10		11-15		16-20		Above 20		Total	
No	%	No	%	No	%	No	%	No	%	No	%
2	6.1	7	21.2	6	18.2	16	48.4	2	6.1	33	100

Table 5 shows that 16+2(48.4% + 6.1%) of the instructor respondents teach 16-20 and above 20 contact hours per week respectively, 2+7+6(6.1%+21.2%+18.2%) of the instructor respondents teach below 15 contact hours weekly. This indicates that most science instructors in the sample colleges were teaching 16 and above contact hours per week and consequently they face shortage of time for preparation, giving advice, tutorial etc. to the needy students. The standard set for the provision of teachers college

education charter states that the teaching load is 12-15 contact hours per week (OEB, 2000).

4.2 Teachers Training

It is obvious that, the instructional methods used in school are highly influenced by implementers' training towards that method among other factors. That is, as implementers of any innovation of classroom teaching, teachers are the influential factors in any education system. The success or failure of any instructional method depends on the skills and ability of classroom teachers. From this point of view, teachers' training about the student-centered method and assessment techniques are crucial in application of the method.

Table 6: Views of Instructors on their Training

No	Items	No	%
1	The focus of their pre-service training		
	A. Academic content	31	93.9
	B. Teaching methods	2	6.1
	C. Teaching practice	-	-
2	Taking any teaching professional course		
	A. Yes	33	100
	B. No	-	-
3	Taking a course on general methods of teaching		
	A. Yes	30	90.9
	B. No	3	9.1
4	Taking a course subject area methodology		
	A. Yes	28	84.8
	B. No	5	15.2
5	Training on student-centered method of teaching and continuous assessment techniques		
	A. Yes	33	100
	B. No	-	-
6	Application of student-centered methods and continuous assessment in the class		
	A. Always	4	12
	B. Often	9	27.3
	C. Sometimes	19	57.6
	D. Rarely	1	3.1
	E. Not at all	-	-

As can be seen from item 1 of table 6, majority of the instructors 31 (93.9%) previous training focused on academic content, which was concerned on the mastery of subject matter. Item 2,3, and 4 indicates that majority of the instructors have taken training on general methods of teaching, subject area methodology and teaching professional courses.

Item 5 of the above table indicates that, all instructors have taken training on student-centered methods of teaching and continuous assessment techniques through in-service training. Regarding the application of student-centered methods and continuous assessment in the class, only 4(12%) and 9(27.3%) used the method always and often, respectively, whereas 19(57.6%) used sometimes. Also the observation made and the interviews conducted with academic deans support the response of the respondents on the usage of student-centered methods and continuous assessment techniques.

Table 7: Instructors Response Regarding Main Reason for the Failure to Use Student-Centered Methods and Continuous Assessment

No	Items	Rank	No	%
1	Course organization does not encourage	-	-	-
2	Nature of the course	-	-	-
3	Lack of awareness	-	-	-
4	Large number of students in a class	1	10	50
5	Lack of facilities	1	7	35
6	Shortage of time	1	3	15
7	Lack of pedagogical skill	-	-	-
8	Students' attitude	-	-	-
9	Lack of leadership commitment	-	-	-

According to instructor respondents, those used student centered-methods and continuous assessment sometimes and rarely the main reason for the failure to use the student-centered methods and continuous assessment was large number of students in the class, lack of facilities and shortage of time. Regarding the class-size Farrent (1980) argued that, class-size is one of the major factors that would influence quality of education provided. For this purpose, instructors were asked to report the average class size 26(78.8%) of the respondents, said 50 and 7(21.2%) of the response show the class size is 48. The result of analyzed document show the average class size is 50. This shows that the class-size is large as compared to the standard class-size per classroom, which is 40 (MOE, 1995). Moreover, the respondents argue that the influence of pre-service training is another reason for the poor implementation of student-centered methods and continuous assessment.

In addition, the academic deans responded that large class-size makes difficult for instructors to help individual students, to give and check different activities and forces them to use only lecture method.

For the question asked about the organization of modules, all the instructors replied that the modules are prepared in relation to student-centered methods.

Table 8: Instructors Response on the Match between Suggested Methods in the Module and Actual Practice

No	Items	No	%
1	How do you evaluate the match between the suggested teaching methods in the module of your course and the actual practice in your classrooms		
	A. Very strong match	2	6.1
	B. Strong match	11	33.3
	C. Weak match	18	54.5
	D. Very weak match	2	6.1
	E. No match at all	-	-

As indicated in the above table 18(54.5%) and 2(6.1%) of the respondents replied that there is a weak and very weak match, respectively between the suggested teaching methods in the module and the actual practice.

Table 9: Reasons for the Mismatch between the Suggested Teaching Methods in the Module and the Actual Practice in the Classroom

No	Items	Rank	No	%
1	Lack of facilities	1	4	20
2	Lack of resources	1	6	30
3	Large number of students	1	8	40
4	Shortage of time	1	2	10

According to instructor respondents, who believed that the match between the suggested teaching methods in the science module and the actual practice the classrooms are weak and very weak, the reason to the mismatch is large number of students, lack of resources, lack of facilities and shortage of time are from severe to moderate.

4.3 Instructors Interest to Science Teaching

The interest of people towards profession is very important because, people will be motivated to perform effectively when they have interest. Instructors' professional interest determines the practice of student-centered method and continuous assessment.

Table 10: Instructors Interest of their Profession

No	Items	No	%
1	Did you choose science based on your interest?		
	A. Yes	31	93.9
	B. No	2	6.1
2	If yes what factors initiated you to become science teacher?		
	A. By chance	6	18.2
	B. Encouragement from science teacher	3	9.1
	C. Good job opportunity	7	21.2
	D. Personal interest in being science teacher	17	51.5
3	Are you satisfied in your practice in science teaching?		
	A. Yes	18	54.5
	B. No	15	45.5

As can be seen from item 1 of table 10, 31(93.9%) of the respondents come to science on interest they have for the discipline. The remaining 2(6.1%) come to the profession without interest.

Item 2 of table 10 shows that 17(51.5%) of the instructor were initiated to be a science teacher by personal interest, 7(21.2%) of them were initiated by good job opportunity, 6(18.2%) of the instructors become science teacher by chance and the remaining 3(9.1%) of the instructors were initiated by their science teachers.

As indicated in item 3 of the above table 18 (54.5%) of the respondents were satisfied in their science teaching and 15(45.5%) were not satisfied in their present practice of science teaching. Instructors' professional satisfaction determines the practice of student-centered method and continuous assessment.

Table 11: Responses of Instructors on their Dissatisfaction in Teaching Science

No	Items	Rank	No
1	Teaching science is difficult	1	2
2	Science teaching requires doing practical work which I can not do for various reasons	-	-
3	The salary is not motivating	1	1
4	Preparing for teaching is tiresome	-	-
5	Most of the students are not interested to learn science	-	-
6	I am not interested in teaching at all	-	-
7	No incentive for additional work	-	-
8	Large number of students in the class	1	5
9	Lack of resources in the laboratory and libraries	1	7

According to the instructors response the main reason for their dissatisfaction was lack of resource. Reference books in Afan Oromo, chemicals and equipments in the laboratory and library services, were not sufficiently available in the selected sample colleges.

Large number of students in one class is another reason for dissatisfaction of science teaching which forces individual teachers to handle many students in a class.

4.4 Relations between General objectives and specific Objectives of Science

The following table (Table-9) presents the data and discussion on the relationships between the general objective of science education and the specific objective of the course.

Table 12: Views of Instructors on the relation between General Objectives of Science and the Objectives of Specific Course

No	Items	No	%
1	Are the general objectives of the policy reflected in the objectives of your subject courses		
	A. Yes	33	100
	B. No	-	-
2	If your response to the above question is yes, to what extent are they reflected?		
	A. Very high	-	-
	B. High	22	66.7
	C. Average	11	33.3
	D. Low	-	-
	E. Not at all	-	-
3	Are the general objectives of TESO program reflected in the objectives of your subject?		
	A. Yes	32	96.9
	B. No	1	3.1
4	If your response is 'yes' to what extent are they reflected?		
	A. Very high	-	-
	B. High	17	53.1
	C. Average	12	37.5
	D. Low	3	9.4

In the case of item 1 of table 12 all of the respondents 33(100%) argued that the general objective of the policy is reflected in the objectives of their subject courses. Respondents were also requested to forward their opinion about the degree of reflection of general objectives of the policy in the objectives of the courses. Thus, as noted in item 2 of table 12, the majority of the respondents 22(66.7%) replied that the general objectives of the policy is reflected highly in the objectives of their subject courses. The other 11(33.3%) replied that the reflection is average.

Similarly, in item 3 of the table, the majority of the instructors 32(96.9%) indicated that the general objectives of TESO program are reflected in their courses.

The last item, item 4 of the table focuses on the degree of the reflection of the general objectives of TESO program and the objectives of the science courses. In this regard, 17(53.1%) of the instructors replied as highly reflected and 12(37.5%) of the respondents replied that TESO objective is reflected averagely in the courses and only 3(9.4%) replied as low reflection

In general, in their recommendations, many of the respondents appreciated the general objectives of the policy and TESO program in saying that it is a student-centered approach, it invites students to be creative, it prepares students for the world of work, etc. and, on the contrary, the objectives had not brought the required progress. Thus, it seems that the problem lies in the implementation process.

4.5 The Practiced Teaching Methods

The following table (Table 13-14) summarizes the degree of practiced student-centered methods of teaching, whether it is practiced or not in the teaching learning process of science courses.

Table 13: The Extent to which Student-Centered Methods have been practiced in the Sample Colleges (as Rated by Students)

No	Items	No	%
1	How often do your science instructors use varieties of teaching methods/strategies?		
	A. Always	16	6.1
	B. Often	72	27.5
	C. Sometimes	143	54.6
	D. Rarely	31	11.8
	E. Not at all	-	-
2	How often do your science instructors focus on teacher dominated lecture method?		
	A. Always	60	22.96
	B. Often	135	51.5
	C. Sometimes	50	19.1
	D. Rarely	17	6.5
	E. Not at all	-	-
3	How often do your science instructors focus on practical application of the courses?		
	A. Always	38	14.5
	B. Often	86	32.8
	C. Sometimes	120	45.8
	D. Rarely	17	6.5
	E. Not at all	1	0.4
4	How often do your science instructors take you out of college for related topics?		
	A. Always	5	1.9
	B. Often	14	5.4
	C. Sometimes	58	22.1
	D. Rarely	62	23.7
	E. Not at all	123	46.9

As can be seen from item 1 of table 13, the majority of the respondents 143(54.6%) and 31(11.8%) those who responded 'sometimes' and 'rarely', respectively indicated that most of science instructors do not practice different student-centered methods of teaching. However, those methods demands learners to exert their own efforts to learn; it encourages them to learn by their own efforts and get high cognition.

Item 2 of table 13 shows that majority of the respondents 135(51.5%) and 60(22.9%) respectively indicated that the majority of instructors were most commonly employing on teacher dominated lecture method. As a comparison, the traditional lecture method makes learners passive and dependent on another person for learning, and consequently it kills learners' creativity.

Item 3 of the above table depicts that 138(52.7%) of respondents responded that the practical activities which are suggested in the modules practiced in the classroom were not satisfactory. The science modules contain a variety of practical activities to support the realization of the course objectives. However, instructors were not being prepared to teach any kind of practical work. In order to develop their skills, students need to experience practical activity in a wide variety of settings (Bekalo & Welford, 2000).

Item 4 of table 13, revealed that 123(46.9%) of the respondents stated that all science instructors didn't take them out of school for related topics. However, field trip helps the learner to acquire knowledge and skills directly from the real world.

Table 14: The Extent to which Student-Centered Strategies have been practiced in the Sample Colleges (as Rated by Instructors and Students)

No	Items	Respondents				Chi- square
		Instructors (no=33)		Students (no=262)		
		No	%	No	%	
1	Explanation/ Teacher dominating lecture					4.69
	A. Always	15	45.5	83	31.7	
	B. Often	14	42.4	105	40.1	
	C. Sometimes	3	9.1	55	21.0	
	D. Rarely	1	3.0	16	6.1	
	E. Not at all	-	-	3	1.1	
	Mean	3.42		3.94		

2	Group work					
	A. Always	9	27.3	76	29.0	1.94
	B. Often	19	57.6	122	46.6	
	C. Sometimes	4	12.1	55	21.0	
	D. Rarely	1	3.0	9	3.4	
	E. Not at all	-	-	-	-	
	Mean	4.09		4.01		
3	Cooperative method					
	A. Always	6	18.2	90	34.3	6.41
	B. Often	15	45.5	116	44.3	
	C. Sometimes	10	30.3	40	15.3	
	D. Rarely	2	6.1	15	5.7	
	E. Not at all	-	-	1	0.4	
	Mean	3.76		4.07		
4	Problem solving					
	A. Always	4	12.1	38	14.5	2.58
	B. Often	10	30.3	64	24.4	
	C. Sometimes	16	48.5	110	42.0	
	D. Rarely	3	9.1	46	17.6	
	E. Not at all	-	-	4	1.5	
	Mean	3.45		3.32		
5	Discovery method					
	A. Always	-	-	19	7.2	30.05
	B. Often	3	9.1	24	9.2	
	C. Sometimes	17	51.5	40	15.3	
	D. Rarely	9	27.3	62	23.7	
	E. Not at all	4	12.1	117	44.6	
	Mean	2.57		1.99		
6	Project method					
	A. Always	1	3.0	6	2.3	39.74
	B. Often	6	18.2	21	8.0	
	C. Sometimes	23	69.7	65	24.8	
	D. Rarely	3	9.1	56	21.4	
	E. Not at all	-	-	114	43.5	
	Mean	3.15		2.04		
7	Filed trip					
	A. Always	-	-	16	6.1	6.28
	B. Often	1	3.0	18	6.9	
	C. Sometimes	3	9.1	33	12.6	
	D. Rarely	6	18.2	68	25.9	
	E. Not at all	23	69.7	127	48.5	
	Mean	1.45		1.58		
8	Role- Play					
	A. Always	1	3.0	35	13.4	21.58
	B. Often	3	9.1	49	18.7	
	C. Sometimes	11	33.3	113	43.1	
	D. Rarely	12	36.4	57	21.7	
	E. Not at all	6	18.2	8	3.1	
	Mean	2.42		3.17		

Item 1 of this table shows the subjects 15(45.5%) and 14(42.4%) of instructors and 83(31.7%) and 105(40.1%) of students responded that the majority of the instructors used explanation/teachers dominated lecture method always and often respectively. The computed value of chi-square ($X^2 = 4.69$, $P > 0.05$) shows that there is no statistically significant opinion difference between the two groups. This further reveal that both of them agree that majority of the instructors use dominated lecture method. However, scholars like Silberman (1996) and Schofield (1972) clearly criticized lecture for it decreases student's attention and, appeals only to auditory learners and promotes lower level of learning of factual information.

As can be seen from item 2 of the above table, the majority of instructor respondents 9(27.3%) and 19(57.6%) rated that, from different strategies of student-centered methods listed in the same table, group work practiced always and often, respectively. Also most of the students 76(29.0%) and 122(46.6%) indicated the practice of group work were always and often respectively. Accordingly, the result revealed from item 2, for 3 degree of freedom at 0.05 level of significance and two-tailed test the critical value of ($X^2 = 9.35$) is found to be greater than the calculated (1.94) value, implying that there is no statistically significant difference in views of the two groups of respondents.

Regarding item 3 of table 14, the majority of instructor respondents 6(18.2%) and 15 (45.4%) rated that, cooperative method practiced always and often respectively. Also most of the students 90(34.3%) and 116(44.3%) indicated the practice of cooperative method is always and often respectively. Accordingly, the result revealed from item 3 for 4 degree of freedom the critical value of ($X^2 = 11.14$) is found to be greater than the calculated (6.41) value implying that there is no statistically significant difference in views of the two groups of respondents.

As indicated in the same table, problem solving method which helps learners to generate solutions to problems that are new to student was used sometimes by the majority of the instructors. About 16(48.5%) and 3(9.1%) of instructors replied that they were using the method 'sometimes' and 'rarely' respectively and 110(42.0%) and 46(17.6%) of students replied that the instructors were using problem solving method 'sometimes' and 'rarely' respectively. Only 10(30.3%) of instructor respondents and 64(24.4%) of students replied that the instructors used this method often in their course. The chi-square result ($X^2 = 2.58$, $P > 0.05$) indicated that there is no statistically significant opinion difference between the two groups on the issue.

Item 5 of table 14 indicated that discovery method which is very important for learners to draw conclusions, concepts, and generalization from some form of induction, observation of principles and help the learners to develop their higher order and critical thinking skills, was not used by the majority of the instructors. 17(51.5%) and 9(27.3%) of the instructors replied as they were using discovery method 'sometimes' and 'rarely' respectively, where as 62(23.7%) and 117(44.6%) of the students replied that the instructors are using rarely and not using this strategy at all respectively. Moreover 19(7.2%) of the student respondents replied as the instructors used the method always. However no instructors replied as they were used the method always. The chi-square result ($X^2 = 30.05$), which is greater than the critical value at ($X^2 = 11.14$) shows that there is significant difference among the respondents' opinions regarding this issue.

The project method which gives the class a real life and results in doing problem solving was not used by the instructors as indicated by the majority of the student respondents. About 114(43.5%) of the students replied that the instructors do not used it at all, but 6(18.2%) and 23(69.7%) of the instructors replied that they are using project method often and sometimes respectively. The observation made also showed that the instructors are not using the method. The chi-square result ($X^2 = 39.74$), which is greater than the critical

value ($X^2 = 11.14$) shows that there is significant difference between the opinion of the instructors and the students. Moreover, the calculated mean scores of the instructors (mean = 3.15) and that of the students (mean = 2.04) indicates that instructors rated it higher than the students which tells us that as the instructors applied the method averagely, whereas the students replied as they applied the method rarely.

In addition to this, also field trip that helps the learners to acquire knowledge and skill directly from the real world is not planned and used by the instructors. A total of 23(69.7%) instructors and 127(48.5%) of the students responded that the instructors are not using field trip at all. Accordingly, the result showed that for 4 degree of freedom at 0.05 level of significance and 2 tailed-tests the table value of X^2 (11.14) was found to be greater than the calculated X^2 (6.28) implying that there is no statistically significant difference between respondents on the issue. This further reveals that both of them agree that field trip was not practiced in the teaching of science. Moreover their mean values (mean=1.45) for instructors and (mean=1.58) for students which shows the instructors do not apply field trip as teaching methods.

Finally, role play which is useful for motivating learners, for deep understanding and preparing learners for real life situation is also not used by the majority of the instructors. A total of 11(33.3%) and 12(36.4%) of the instructors used it 'sometimes' and 'rarely' respectively and 113(43.1%) and 57(21.7%) of the students replied that the instructors use role play 'sometimes' and 'rarely' respectively. The computed value of chi-square ($X^2 = 21.58$, $P < 0.05$) shows that there is statistically significant opinion difference between the two groups. This further reveals they do not agree on the application of role play in science classes. Generally these reveals that the strategies of student-centered methods are not practiced well.

4.6 Students' Attitude

The success or failure of any instructional method ultimately depends on the attitudes, values, skills and ability of implementers. From this point of view, students' attitude about student-centered method and continuous assessment is crucial in application of the techniques.

Table 15: Views of Instructors Regarding the Attitude of Students towards Student-Centered Methods and Continuous Assessment.

No	Items	No=33	
		No	%
1	The majority of my student are less motivated to put extra effort to achieve the course objectives		
	A. Strongly agree	7	21.2
	B. Agree	17	51.5
	C. Undecided	3	9.1
	D. Disagree	2	6.1
	E. Strongly disagree	4	12.1
2	Most of my students often are not eager to do assignment and projects		
	A. Strongly agree	3	9.1
	B. Agree	14	42.4
	C. Undecided	8	24.2
	D. Disagree	5	15.2
	E. Strongly disagree	3	9.1
3	The majority of my students are willing to spend time in the laboratory to do practical works		
	A. Strongly agree	2	6.1
	B. Agree	10	30.3
	C. Undecided	1	3
	D. Disagree	19	57.6
	E. Strongly disagree	1	3.0
4	Most of my students are willing to spend more time to study the lesson		
	A. Strongly agree	2	6.1
	B. Agree	9	27.3
	C. Undecided	6	18.2
	D. Disagree	16	48.5
	E. Strongly disagree	-	-

As shown above, table 15 focuses on students' motivation to learn and their attitude towards learning science. Instructors were asked to forward their opinion on the attitude of students towards learning and their motivation to learn. Thus, as it is shown in item 1 of table 15, the majority of the instructors

17(51.5%) and 7(21.2%) responded 'agree' and 'strongly agree' as the majority of their students are less motivated to put extra effort to achieve the course objectives.

Regarding the 2nd item of this table, 14(42.4%) of the instructors said that most of their students are not eager to do assignments and projects. About 8(24.2%) of the instructors rated undecided about the interest of the students in doing assignments and projects and 5(15.2%) of the instructors disagree with the item.

The respondents were also asked about students' willingness to spend time in the laboratory to do practical works. Thus, 19(57.6%) of the instructors disagree on the willingness of the students to do practical work in the laboratory, and 10(30.3%) of the respondents agree on the assertions.

Item 4 is about students' class work and homework. Regarding this item, the majority of the instructors 16(48.5%) disagree, whereas 9(27.3%) of the instructors agree on the idea and the issue was undecided by 6(18.2%) of the respondents.

Generally, motivation or an internal drive of people determines their effectiveness in their work. However, the above finding depicts that most students do not have an internal drive or commitment to carry out their tasks successfully. And thus, it seems that this low concern for learning by the students has brought poor result in the implementation of student-centered methods in science teaching.

4.7 Availability and Adequacy of Resources

The teaching-learning process will achieve its intended objectives effectively if the learning centers environments are in a supportive condition for the implementation process. Accordingly, the following table (Table-16) shows the availability of essential resources in the sample colleges relevant to the practice of student-centered approach and continuous assessment.

Table 16: Views of Respondents Regarding the Availability and Adequacy of Resources

No	Item	Respondents					
		Instructors (n=33)		Students (n=262)		Chi-Square	
		No	%	No	%		
1	There are adequate modules available for teaching science					2.33	
	A. Strongly agree	-	-	15	5.7		
	B. Agree	6	18.2	42	16.0		
	C. Undecided	5	15.2	36	13.7		
	D. Disagree	21	63.6	156	59.6		
	E. Strongly disagree	1	3.0	13	5.0		
	Mean	2.66		2.58			
2	There are adequate laboratory equipment for teaching during lab sessions					6.22	
	A. Strongly agree	-	-	32	12.2		
	B. Agree	6	18.2	42	16.0		
	C. Undecided	6	18.2	25	9.5		
	D. Disagree	16	48.5	126	48.1		
	E. Strongly disagree	5	15.1	37	14.1		
	Mean	2.51		3			
3	The laboratory space is enough to accommodate students during lab. Sessions					8.06	
	A. Strongly agree	3	9.1	5	1.9		
	B. Agree	3	9.1	44	16.8		
	C. Undecided	4	12.1	32	12.1		
	D. Disagree	17	51.5	111	42.4		
	E. Strongly disagree	6	18.2	70	26.7		
	Mean	2.90		2.58			
4	There are sufficient science reference books in the library					30.38	
	A. Strongly agree	3	9.1	23	8.8		
	B. Agree	11	33.3	14	5.3		
	C. Undecided	6	18.2	53	20.2		
	D. Disagree	8	24.2	104	39.7		
	E. Strongly disagree	5	15.2	68	26.0		
	Mean	2.96		2.31			
5	The library facilities are motivating students for reading					7.70	
	A. Strongly agree	14	42.4	117	44.7		
	B. Agree	12	36.4	100	38.2		
	C. Undecided	2	6.1	25	9.5		
	D. Disagree	1	3.0	13	4.9		
	E. Strongly disagree	4	12.1	7	2.7		
	Mean	3.36		4.17			

6	There are sufficient desks and chairs in classrooms					
	A. Strongly agree	17	51.5	135	51.5	1.43
	B. Agree	13	39.4	105	40.1	
	C. Undecided	3	9.1	15	5.7	
	D. Disagree	-	-	5	1.9	
	E. Strongly disagree	-	-	2	0.8	
	Mean	4.42		4.39		
7	There are notice board and black board for difference activities					
	A. Strongly agree	11	33.3	88	33.6	2.56
	B. Agree	12	36.4	113	43.1	
	C. Undecided	9	27.3	45	17.2	
	D. Disagree	1	3.0	13	5.0	
	E. Strongly disagree	-	-	3	1.1	
	Mean	3.96		4.03		
8	There are adequate teachers for teaching the subject					
	A. Strongly agree	12	36.4	-	-	
	B. Agree	14	42.4	-	-	
	C. Undecided	6	18.2	-	-	
	D. Disagree	1	3.0	-	-	
	E. Strongly disagree	-	-	-	-	
	Mean	4.09				
9	There are available and adequate lab technicians for teaching science					
	A. Strongly agree	4	12.1	-	-	
	B. Agree	8	24.2	-	-	
	C. Undecided	2	6.1	-	-	
	D. Disagree	14	42.4	-	-	
	E. Strongly disagree	5	15.2	-	-	
	Mean	2.75				
10	There are available and adequate librarians					
	A. Strongly agree	2	6.1	-	-	
	B. Agree	6	18.2	-	-	
	C. Undecided	8	24.2	-	-	
	D. Disagree	15	45.4	-	-	
	E. Strongly disagree	2	6.1	-	-	
	Mean	2.54				

As can be seen from item 1 of the above table 21(63.6%) of the instructor and 156(59.6%) of the student respondents reported that there is shortage of science modules in the sample colleges. Accordingly, the chi-square result revealed that for 4 degree of freedom at 0.05 level of significance at 2 tailed-test the critical value of ($X^2 = 11.14$) was found to be greater than the calculated ($X^2 = 2.33$) implies that there is no statistically significant difference between the two groups of respondents. This is contrary to what is stated in ESPD II which states that every student would be provided with essential text-books (MOE;

ESPD II, 2002). It can be concluded that students of colleges in the study area are suffering from shortage of modules. Therefore, this has an adverse effect on the practice of student-centered method and assessment techniques in teaching science.

Item 2 and 3 of the table depicts the adequacy of laboratory services in the respective colleges. Regarding this, the majority of the respondents 16+17(48.5%+51.5%) and 5+6(15.1%+18.2%) of instructors and 126+111(48.1%+42.36%) and 37+70(14.1%+26.7%) of students pointed that the laboratory service provision is inadequate. In addition the justification gained from interviewees showed that there is a shortage in the laboratory services. Moreover, the respondents also argued that the laboratory rooms were not equipped with standard tables and chairs, the rooms have no enough space to accommodate the students during lab sessions.

Regarding item 4 of table 16, 3(9.1%) and 11(33.3%) of the instructors strongly agree and agree respectively in the presence of science reference books in the library, whereas 5(15.2%) and 8(24.2%) strongly disagree' and disagree respectively on the same issue. The majority of the students 68(25.9%) and 87(33.2%) strongly disagree and disagree on the issue. The computed value of chi-square ($X^2 = 30.38$, $P < 0.05$) shows that there is statistically significant opinion difference between the instructors and students on the item. Most of the student respondents pointed that 'Afan Oromo' versions of science reference books were few in their colleges.

Item 5 of the above table shows that almost all the student respondents 117(44.7%) and 100(38.2%) and the majority of instructor respondents 7(21.2%) and 12(36.4%) strongly agree and agree on the assertion that the library facilities were motivating students for reading. The critical value of X^2 at 0.05 level of significance is 11.14 and the calculated X^2 value is 7.70. Thus, there is no statistically significant difference in the views of the two groups of respondents in the library facilities of the sample colleges.

As indicated in item 6 of table 16, the majority of the respondents 17(51.5%) and 13(39.4%) of instructors and 135(51.5%) and 105 (40.1%) of students strongly agree and agree on the statement; there are sufficient desks and chairs in the sample colleges. The computed value of chi-square ($X^2 = 1.43$, $P > 0.05$) shows that there is no statistically significant opinion difference between the two groups. This implies that, both of them agree that there are no shortage of desks and chairs.

In item 7 of this table most of the respondents 11(33.3%) and 12(36.4%) of instructors and 88(33.6%) and 113(43.1%) of students strongly agree and agree on the presence of notice board and black board for different activities. The chi-square result ($X^2 = 2.56$, $P > 0.05$) indicates that there is no statistically significant opinion difference between the instructor and student respondents. This implies that both of them agree that there is no shortage of boards. Also the observation made result share the respondents' idea on the issue.

Item 8 of table 16, states that 'there are adequate teachers for teaching the subjects'. Based on this, the response of instructors 12(36.4%) and 14(42.4%) strongly agree and agree on the issues respectively. Moreover, the interviewed deans reported that all science instructors fulfil minimum required qualification expected from instructors to teach in teachers college which should be BED/BSC (OEB, 2000).

As can be seen from item 9 of table 16, 14(42.7%) and 5(15.2%) of instructors disagree and strongly disagree on the availability and adequacy of laboratory technicians to teach science in the sample colleges. Responses from the interviews also indicated that most of them are not qualified as laboratory technicians. They are diploma holders in teaching the subject. Accordingly, they are not able to satisfy the need of students.

Regarding item 10 of the above table, according to the majority of the instructors 15(45.4%) and 2(6.1%), most of the librarians are not professionals. Due to this problem students may not get adequate service from the libraries.

Responses from the interview also indicate that the librarians' service is insufficient. The problem due to insufficient library service not only affects the students but also the instructors in the practice of student-centered teaching methods and assessment practices. The absence of such facilities and inadequacy of other instructional materials forces the instructors simply to transplant theoretical conception in the minds of the students without showing any practical work.

4.8 Assessment practiced

Whether a given lesson is understood by the learner or not is checked by the instructors through assessment. This could be through applying different assessment techniques and regular follow-up of the students' activities. In recognition of this fact instructors and students were asked about assessment techniques which were used by the instructors and their follow up was presented to respondents with five alternatives (see Table 17-18).

Table 17: The Extent to which the Instructors have been practiced Continuous Assessment in the Sample Colleges (as Rated by Instructors and Students).

No	Item	Respondents				
		Instructors (n= 33)		Students (n= 262)		
		No	%	No	%	Chi-square
1	How often class work individual and/or group works given by instructors					
	A. Daily	13	39.4	47	17.9	15.27
	B. Every two or three days	10	30.3	81	30.9	
	C. Every week	6	18.2	117	44.7	
	D. Twice in a semester	4	12.1	12	4.58	
	E. Once in a semester	-	-	5	1.9	
	Mean	3.96		3.56		
2	How often the instructors give home works					
	A. Daily	5	15.2	43	16.4	3.22
	B. Every two or three days	10	30.3	70	26.7	
	C. Every week	14	42.4	124	47.4	
	D. Twice in a semester	4	12.1	15	5.7	
	E. Once in a semester	-	-	10	3.8	
	Mean	3.48		3.46		
3	How often the instructors made observation on students works					
	A. Daily	-	-	2	0.8	7.42
	B. Every two or three days	1	3.0	20	7.6	
	C. Every week	2	6.1	50	19.1	
	D. Twice in a semester	8	24.2	75	28.6	

	E. Once in a semester	22	66.7	115	43.9	
	Mean	1.45		1.92		
4	How often the instructors assess students laboratory works					
	A. Daily	—	—	—	—	67.24
	B. Every two or three days	—	—	3	1.1	
	C. Every week	33	100	72	27.5	
	D. Twice in a semester	—	—	187	71.4	
	E. Once in a semester	—	—	—	—	
	Mean	3.00		2.29		
5	How often the instructors ask students oral question					
	A. Daily	32	97.0	246	93.9	0.51
	B. Every two or three days	1	3.0	16	6.1	
	C. Every week	—	—	—	—	
	D. Twice in a semester	—	—	—	—	
	E. Once in a semester	—	—	—	—	
	Mean	4.96		4.93		
6	How often the instructors assess students demonstration					
	A. Daily	—	—	—	—	
	B. Every two or three days	—	—	—	—	
	C. Every week	2	6.06	—	—	
	D. Twice in a semester	24	72.72	56	21.37	
	E. Once in a semester	7	21.21	44	16.79	
	F. Other	—	—	162	61.83	
	Mean					
7	How often the instructors give classroom tests/quizzes					
	A. Daily	—	—	—	—	0.76
	B. Every two or three days	—	—	—	—	
	C. Every week	1	3.0	5	1.9	
	D. Twice in a semester	10	30.3	98	37.4	
	E. Once in a semester	22	66.7	159	60.7	
	Mean	1.36		1.41		

As can be observed from item 1 of table 17, the majority of instructor 13(39.4%) and 10(30.3%) respondents are giving class works every two or three days and every week, respectively. Where as majority 117(46.7%) of student respondents reported that the instructors give class work/group work every week. The chi-square result($X^2 = 15.27$, $P < 0.05$) shows that there is a significant difference between the opinion of the instructors and the students.

Results in item 2 of the above table indicate that 5(15.2%) of instructors assign homework daily, 10(30.3%) every two or three days, 14(42.4%) every week and 4(12.1%) two times in a semester, And 43(16.4%) students responded that the instructors assign homework daily, 70(26.7%) every two or three days,

124(47.4%) every week. The computed value of chi-square ($X^2 = 3.44$, $P > 0.05$) indicated that there is no statistically significant opinion difference between the two groups. This further reveal that majority of them agree that the instructors were assign home work every week. According to Cooper (1989) as cited in Adane and Dawit (2000) students from grades 10 to 12 would be given three to five assignments a week.

Regarding item 3 of table 17, the majority of the respondents 30(90.1%) instructor and 190(72.52 %) student respondents reported that observation was not used properly. The result showed that for 4 degree of freedom at 0.05 level of significant table value of chi-square($X^2=11. 14$) is found to be greater than the calculated value($X^2=7.44$) implying that there is no statistically significant difference between the instructors and students view on the item. Moreover, the calculated mean scores of the instructors (mean = 1.45) and that of the students (1.92) indicates that both of the respondents rated the item below average; however, instructors rated it lower than the students which tell us that they perceived the practice of observation less than the students did. As depicted from the above, observation was not taken as a method of assessment techniques to check student performance. But observation as a technique of assessment helps the teacher to know individual student's performance. It takes in to account those aspects of students' performance or behaviour that cannot be easily assessed through information from other sources of evaluation data. Therefore, observation should be taken into account as a technique of assessment (Newfound Land, 2000).

As shown in item 4 of table 17, about 33(100%) of the instructor respondents said laboratory work was given every week. However, 187 (71.37 %) of the student respondents reported that the laboratory work was given twice a semester. The calculated chi-square result ($X^2 = 67.24$) for 2 degree of freedom at 0.05 level of significant was found to be greater than the table value($X^2 = 7.38$) implying that there is statistically significant difference between the opinion of the two groups of respondents. Moreover, the calculated mean value

of instructors (mean=3.00) and that of the students (mean= 2.29) indicates that students rated lower than the instructors which tell us that they perceived that the instructors didn't apply laboratory work than the instructors did. The result of the above table shows that an oral question was the most frequently used assessment techniques.

In case of demonstration (project work) the majority of the instructors 24(72.72%) reported that they used project work assessment twice in a semester. Whereas, the majority of the student 162 (61.83%) respondents said that they had never been provided with such type of assessment.

Item 7 of the above table, revealed that the majority of the subjects, 22(66.7%) of instructors and 159(60.7%) of students responded that the instructors gave one test for a course in a semester. The mean score of instructors (mean=1.36) and students (mean=1.41) show that the students are not getting sufficient test (below average). Also the chi-square result confirmed that there is insignificant difference between the responses of the two groups ($P>.05$). This finding was consistent with the results obtained from the document analysis. One test might not be considered as implementing continuous assessment.

Generally, table 17 showed that the instructors used a few type of tools in which assignments/class work, homework/ group works are dominating the rest. The interview and the document analysis result as well showed that instructors mostly used assignments, oral questions, class work /homework. But, project, observation of students work and tests are rarely used tools of assessment. It should be understood that continuous assessment is an integral part of the learning process. Singer (2003) stated that continuous assessment can take the form of daily work (e.g. Quizzes, presentation, and participation in class, projects and practical work).

Table 18: Responses Regarding Follow-up Assessment by Instructors

No	Item	Respondents				
		Instructors		Students		Chi-Square
		No	%	No	%	
1	How often the instructors (ask questions, give class works, home works and assignments) with open-ended questions?					
	A. Always	3	9.1	43	16.4	6.88
	B. Often	2	6.1	55	21.0	
	C. Sometimes	18	54.5	98	37.4	
	D. Rarely	10	30.3	66	25.2	
	E. Not at all	-	-	-	-	
	Mean	2.93		3.28		
2	How often instructors check students' works (home work, class works and assignments) and give them constructive feedbacks?					
	A. Always	3	9.1	45	17.2	20.59
	B. Often	10	30.3	43	16.4	
	C. Sometimes	17	51.5	66	25.2	
	D. Rarely	2	6.1	102	38.9	
	E. Not at all	1	3.0	6	2.3	
	Mean	3.36		3.07		
3	How often the instructors evaluate students group works?					
	A. Always	5	15.2	-	-	199.74
	B. Often	18	54.5	-	-	
	C. Sometimes	6	18.2	196	74.80	
	D. Rarely	2	6.1	54	20.61	
	E. Not at all	2	6.1	12	4.58	
	Mean	3.63		2.70		
4	How often the majority of instructors made tests and exams that focus on recalling of facts theories and formulae?					
	A. Always	9	27.3	123	46.9	7.38
	B. Often	16	48.5	89	34.0	
	C. Sometimes	4	12.1	34	13.0	
	D. Rarely	2	6.1	12	4.6	
	E. Not at all	2	6.1	4	1.5	
	Mean	3.81		4.20		
5	How often instructors use different assessment techniques to gather data about students learning					
	A. Always	6	18.2	2	0.8	106.59
	B. Often	12	36.4	9	3.4	
	C. Sometimes	12	36.4	38	14.5	
	D. Rarely	3	9.1	201	76.7	
	E. Not at all	-	-	12	4.6	
	Mean	3.63		2.19		
6	How often the instructors accept feedbacks from their students					
	A. Always	12	36.4	9	3.4	115.46
	B. Often	13	39.4	11	4.2	
	C. Sometimes	7	21.2	32	12.2	
	D. Rarely	1	3.0	143	54.6	
	E. Not at all	-	-	67	25.6	
	Mean	4.09		2.05		

Regarding item 1 of table 18, the majority of the instructors ask close-ended questions based on recalling and memory. Moreover, in observed classrooms the questions asked are close-ended based on recalling, reasoning questions which requires time to think are not asked. However, according to Plass (1998), teachers' questions should be open-ended, help students to articulate and defend or modify their opinions to feel confident about their knowledge.

As can be seen from item 2 of table 18, according to the instructors response 17(51.5%) of them check students work and give them feedback sometimes. However, the majority 102(38.9%) of the student respondents indicate that teachers check students work and give them feedback rarely. When considering the chi-square test for this item($X^2=20.59$), the responses indicated the existence of significant difference at $P= .000$ value. Teachers are expected not only to check whether class works, home works and assignments are done or not, but also to provide feedback. Because of the large number of students in a class instructors may not have enough time to check on every student activities. However, unless there is a follow-up of the students' activities by giving exercises regularly, one can not expected students' achievement in a way required.

As can be observed from item 3 of the above table, the majority of the instructor 5(15.15%) and 18(54.54%) respondents replies that they assess students work always and often respectively to check on their progress and help where necessary. Whereas, the majority of the student 196 (74.80%) respondents replies that the instructors assess students' group cooperation sometimes. The chi-square result ($X^2 = 199.74$, $P<.05$) shows that there is a statistically significant difference between responses of the two groups. The calculated mean scores of the instructors (mean=3.63) and students (mean= 2.70) reveals that the instructors rated the item above average, whereas the students rated the item below average. According to them the most widely employed mechanism of assessing students' group work was asking students to provide final products of their group work. From the above descriptions, it can be said

that instructors have given more emphasis to the product of group cooperation and ignoring its process. In contrary to instructors' mechanism the literature indicates that:

The teacher should monitor and support group activities for example, ask students to provide regular updates or reports or meet with groups to check their progress and team processes. When conflict arises with the group encourage the group members to negotiate a resolution themselves-step in only as a last result (University of New South Wales, 2006).

According to the majority of instructor 25(75.75%) and 212(80.91%) student respondents, the majority of instructors made test and exams are focus on recall of information, knowledge associated with conceptual understanding. The value of chi-square, ($X^2=7.38$, $P>.05$), shows that there is no statistically significant opinion difference between the two respondents. The implication here is that, most of the instructors made questions were not promote and enhance the place of practical work in science.

Item 5 of table 18, shows that majority 6(18.18%) and 12(36.4%) of the instructor respondents are using different assessment techniques always and often, respectively. Whereas, the majority 201(76.71%) of the student respondents indicated that the instructors are using different assessment methods rarely. The mean score of instructors (mean=3.69) and students (mean=2.19) also reveal that the students rated the item below average. As the degree of association or difference between respondents' opinion is concerned, the chi-square result ($X^2=106.59$, $P<.05$) shows that there is statistically significant difference between their opinion. However, using different types of assessment techniques for better judgment of students' ability of performance is essential.

As indicated in item 6 of table 18, the majority of the instructor 11(33.3%) and 13(39.4%) respondents have willingness to accept feedback from students always and often respectively. However, the responses of student indicate that

only a few of instructors have willingness to accept feedback from students. The calculated mean scores of the instructors (mean=4.09) and that of the students (mean=2.05) depict that the student respondents rated the item below the average. A calculated result of chi-square ($X^2=115.46$, $P<.05$) indicates that there is a significant difference between the opinion of the instructors and the student respondents. According to Kamongina (2003) feedback is a mirror for both students and teachers. It enables the teachers to know their performance in teaching and enables the learners to know their performance in learning.

4.9 Instructors and Students Perception

In order to assess perceptions of instructors and students towards student-centered methods and continuous assessment, they were asked to reflect what they feel, believe or thing about student-centered methods and continuous assessment techniques. To achieve these 12 items which had 5 point response scales were administered.

Table 19: Response of Instructors and Students in Understanding of Student – centered Methods and Continuous Assessment

No	Items	Respondents				
		Instructors (n=33)		Students (n=262)		Chi-Square
		No	%	No	%	
1	A good teacher is some one who prepares notes for study from textbooks					93.83
	A. Strongly agree	5	15.2	112	42.7	
	B. Agree	5	15.2	99	37.8	
	C. Undecided	5	15.2	42	16.0	
	D. Disagree	15	45.4	7	2.7	
	E. Strongly disagree	3	9.1	2	0.8	
	Mean	2.82		4.19		
2	Learning occurs when students are silent and listen to their teachers					39.43
	A. Strongly agree	2	6.1	92	35.1	
	B. Agree	1	3.0	67	25.6	
	C. Undecided	5	15.2	32	12.2	
	D. Disagree	8	24.2	34	13.0	
	E. Strongly disagree	17	51.5	37	14.1	
	Mean	1.87		4.41		
3	Students should take self-responsibility for their own learning					2.42
	A. Strongly agree	25	75.7	204	77.8	
	B. Agree	6	18.2	51	19.5	
	C. Undecided	2	6.1	5	1.9	
	D. Disagree	-	-	2	0.8	
	E. Strongly disagree	-	-	-	-	

	Mean	4.69		4.74		
4	Student-centered method makes the teacher free and the students busy					
	A. Strongly agree	3	9.1	80	30.5	50.25
	B. Agree	2	6.1	57	21.7	
	C. Undecided	2	6.1	50	19.1	
	D. Disagree	5	15.1	40	15.3	
	E. Strongly disagree	21	63.6	35	13.4	
	Mean	1.8		3.4		
5	Learning becomes meaningful when students discover knowledge rather than receiving from the teacher.					
	A. Strongly agree	26	78.8	148	56.5	6.52
	B. Agree	6	18.2	91	34.7	
	C. Undecided	1	3.0	11	4.2	
	D. Disagree	-	-	5	1.9	
	E. Strongly disagree	-	-	7	2.7	
	Mean	4.69		4.4		
6	Students learn more when each and every activity is done by the teacher in the classroom					
	A. Strongly agree	-	-	7	2.7	3.57
	B. Agree	1	3.0	15	5.7	
	C. Undecided	2	6.1	33	12.6	
	D. Disagree	17	51.5	101	38.5	
	E. Strongly disagree	13	39.4	106	40.5	
	Mean	1.72		1.91		
7	Student initiation is decisive for teaching learning process.					
	A. Strongly agree	21	63.6	165	63.0	5.91
	B. Agree	7	21.2	47	17.9	
	C. Undecided	5	15.2	20	7.6	
	D. Disagree	-	-	22	8.4	
	E. Strongly disagree	-	-	8	3.1	
	Mean	4.48		4.29		
8	Teachers should not give assignment on issue that are new to students					
	A. Strongly agree	1	3.0	92	35.1	89.96
	B. Agree	2	6.1	97	37.0	
	C. Undecided	2	6.1	35	13.4	
	D. Disagree	22	66.6	23	8.8	
	E. Strongly disagree	6	18.2	15	5.7	
	Mean	2.09		3.87		
9	Students should freely express their ideas in the classroom					
	A. Strongly agree	31	93.9	207	79.0	5.32
	B. Agree	2	6.1	20	7.6	
	C. Undecided	-	-	13	5.0	
	D. Disagree	-	-	22	8.4	
	E. Strongly disagree	-	-	-	-	
	Mean	4.94		4.57		
10	Group work can strengthen learners' friendship and facilitate learning					
	A. Strongly agree	22	66.7	42	16.0	52.36
	B. Agree	10	30.3	72	27.5	
	C. Undecided	1	3.0	8	3.1	
	D. Disagree	-	-	56	21.4	
	E. Strongly disagree	-	-	84	32.0	
	Mean	4.63		2.74		
11	The teacher has to guide students to learn rather than teaching every thing					
	A. Strongly agree	24	72.8	9	3.4	
	B. Agree	8	24.2	21	8.1	

	C. Undecided	1	3.0	50	19.1	160.94
	D. Disagree	-	-	102	38.9	
	E. Strongly disagree	-	-	80	30.5	
	Mean	4.63		2.14		
12	Students learn more when what they learn is related to their environment					
	A. Strongly agree	27	81.8	177	67.6	5.65
	B. Agree	4	12.1	64	24.4	
	C. Undecided	2	6.1	7	2.7	
	D. Disagree	-	-	8	3.1	
	E. Strongly disagree	-	-	6	2.3	
	Mean	4.75		4.51		

About 112 (42.7%) and 99(37.8%) of the student respondents strongly agree and agree, respectively with the 1st item of the above table, while 15(45.4%) and 3(9.1%) of the instructor respondents disagree and strongly disagree, respectively on the above issue. The chi-square result revealed that at 0.05 level of significance the table value of chi-square($X^2 = 11.14$) found to be less than the calculated value($X^2=93.83$) implying that there is statistically significant difference in perception. Moreover, the mean scores of the instructors (mean=2.82) and that of the students (mean=4.19) indicates that the majority of the students wrongly perceived the role of instructors. According to this group of students, teachers prepare notes for study for students to memorize the information to pass examination. However, Lue (2000) argued that the role of teacher is not only to give information, but also to organize the activities through which students will gather or use information, guide the students through these activities, help them find additional sources of information, make sure that students are really thinking, and analyzing and check their progress regularly to make sure that all students are learning.

Item 2 of this table is strongly agree and agree by the majority of the student respondents respectively, that is 92(35.1%) and 67(25.6%) of the respondents said students learn by receiving information from teachers whereas, 8(24.1%) and 15(51.5%) of the instructor respondents disagree and strongly disagree on the issue. The calculated mean scores of students (mean=4.74) and that of instructors (mean=1.87). Also the value of chi-square($X^2=39.43$, $P<.05$) indicates that there is statistically significant difference between the opinion of

respondents; that is as it can be seen from their mean value the students are not understand the item properly.

What can be said from the above finding is that knowledge is not something that can be simply given by the teacher to the students who are passive and silent in their desk. Rather, it constructed by learners through an active, mental process of development. Learners are the builders and creators of meaning and knowledge through active participation in learning process. Thus, these fundamental issues that oppose student-centered methods are not properly understood by the student respondents in the study.

Item 3 of table 19 is strongly agree and agree by 25(75.7%) and 6(18.2%) of the instructor respondents and 204 (77.8%) and 51(19.5) of the student respondents. The chi-square($X^2=2.42$, $P>.05$) result reveals that the existing difference between the opinion of respondents is not statistically significant. Regarding the responsibility of learners in student-centered classes, Temechegn (2001) emphasized that the student has full responsibility for his/her own learning. Learning is self-initiated, and often involves the process of inquiry and discovery.

Regarding item 4 of the above table about 80(30.5%) and 57(21.7%) of the student respondents strongly agree and agree whereas, 5(15.1%) and 21(63.6%) of the instructor respondents disagree and strongly disagree respectively. The mean values of the students (mean=3.4) and the instructors (mean=1.8) and the calculated chi-square($X^2=50.25$, $P<.05$) shows that there is statistically significant difference between respondents' opinion. As indicated above the student respondent didn't understand the role of teachers in student-centered methods. In literature part of this paper, in student-centered methods the teacher is no less important than in the teacher-centered classroom. He has a great responsibility to guide and manage the activities and make sure that all students are working productively on the activities and monitor the progress of all pupils.

In the above table, for item 5, the majority 26(78.8%) and 6(18.2%) of instructor respondents and 148(56.5%) and 91(34.7%) of student respondents strongly agree and agree with the statement. The chi-square($X^2=6.52$, $P>.05$) result indicates that there is no statistically significant difference between respondents' opinion. Supporting this Lue (2000) learning is meaningful only when pupils actively participate in it. Learning is more meaningful, and therefore, more usable when learners seek out and discover knowledge rather than just being receivers of knowledge.

Item 6 of table 19 is strongly disagree and disagree by 13(39.4%) and 17(51.5%) of the instructor and 106(40.5%) and 101(38.5%) of the student respondents respectively. Though the result of chi-square($X^2=3.57$, $P>.05$) indicates that the existing difference between respondents is not statistically significant and the calculated mean scores of the instructors (mean=1.72) and the students (mean=1.91), which are rated below average also harmonized with the report that the teachers' role should be to help the learners to think, solve problems and discover things for themselves.

As can be seen from item 7 of table 19 majority of the respondents 21(63.6%) and 7(21.2%) instructors and 165(63.0%) and 47(17.9%) students strongly agree and agree, respectively the assertion, only about 8(3.1%) and 22(8.4%) of the student respondents strongly disagree and disagree to the issue. Also the chi-square result($X^2=5.91$, $P>.05$) reveals that there is no statistically significant variation between them in their opinion. The calculated mean scores of the instructors (mean=4.48) and the students (mean=4.29) tell us that both respondents rated the item above the average. Since learning is self-initiated this basic concept about learning has to be positively perceived by the learners.

Item 8 of the above table is strongly agree and agree by 92(35.1%) and 97(37.0%) of the student respondents, whereas, 6(18.2%) and 22(66.6%) of the instructor respondents strongly disagree and disagree in this issue. The calculated mean scores of the instructors (mean=2.09) and the students (mean=3.87) tell us that the instructors rated the item below the average. The chi-square result($X^2=89.96$, $P<.05$) also confirms that there is significant

difference between the two groups of respondents. This implies that the learners are favouring the traditional method of learning where teachers are considered as a source of knowledge and the learners passively receive information from their teachers.

With regard to item 9 of table 19, 31(93.9%) and 2(6.1%) of the instructor and 207(79.0%) and 20(7.6%) of the student respondents strongly agree and agree, respectively with the statement. The calculated mean scores of the instructors (mean=4.94) and the students (mean=4.57) which are rated above average. The chi-square result($X^2= 5.32$, $P>.05$) also indicates that there is no significant difference between both of the respondents in their opinion on this item.

As can be seen from item 10 of the same table, 42(16%) and 72(27.5%) of the student respondents and 31(93.9%) and 2(6.1%) of the instructor respondents strongly agree and agree with the statement. Whereas about 84(32%) and 56(21.4%) of the student respondents strongly disagree and disagree with this issue. The calculated mean scores of the instructors (mean=4.63) and the students (mean=2.74) tell us that the students rated the item below the average. This implies that large number of student respondents do not positively receive the importance of group work in teaching and learning process. Also the chi-square result($X^2=52.36$, $P<.05$) reveals that there is statistically significant variation between them in their opinion. However, as indicated in literature part of this paper, group work is one of the best ways of encouraging active learning. When students are placed in groups, they tend to become more engaged in learning, because they are doing it with their peers. This important role of group work in teaching learning process is misperceived by large number of the student respondents. It seems the method was wrongly practiced in the teaching learning process.

Item 11 of the above table is strongly agree and agree by 24(72.8%) and 8(24.2%) of the instructor respondents, respectively. Whereas strongly disagree and disagree by 80(30.5%) and 102(38.9%) of the student respondents. The chi-square result($X^2=160.94$, $P<.05$) shows a statistically significant difference

between the opinion of the respondents. On the other hand, the mean values of the instructors (mean=4.63) and students (mean=2.14) reveal that the students rated the item below average which means that the student do not understand the role of the teacher in student centered method. Concerning the role of teacher as a facilitator, Amare (2000) emphasized that the appropriate role of teachers is accepted to be managerial rather than pedagogical.

The last item of the table, is strongly agree and agree by 27(81.8%) and 4(12.1%) of the instructor and 177(67.5%) and 64(24.4%) of the student respondents. Also the chi-square result($X^2= 5.65$, $P>.05$) reveals that there is no statistically significant variation between them in their opinion. Moreover, the calculated mean value of instructors (mean=4.75) and that of the students (mean= 4.51) indicates that both of them rated the item above average, this implies that majority of respondents perceived the issue positively. Supporting this Zmuda and Tomaino (2001) argue that people learn best when they make connections between what they already know and what they are learning. This means learning is the product of interaction among the learners knowledge and information of their environment and activities of the learner.

In general, some items that favour the student-centered methods and continuous assessment are negatively perceived by the majority of the student respondents. Thus, since students can make great contribution and play a significant role in the student-centered classes, their wrong perception of the student-centered methods and continuous assessment can influence the whole teacher's activity to carry out their teaching tasks.

CHAPTER 5: SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter presents summary of the major findings, conclusions and recommendations that are assumed to be useful to alleviate the problems of the practice of student-centered methods of teaching and continuous assessment in Oromia teachers colleges.

5.1 Summary

The main purpose of this study is to assess the practice of student-centered methods and continuous assessment techniques in selected Oromia Teachers college. In order to achieve the purpose of this study, basic research questions were raised formulated regarding the current status of student-centered method and assessment techniques, whether the practiced methods address the curriculum objectives and questions that can help to identify the challenges in practising student-centered and continuous assessment in the study area were stated.

The study method employed was descriptive survey type conducted in Oromia teachers colleges. The sampling techniques used were a mix of techniques as they were appropriate. Hence availability sampling and random selection technique were used.

In order to address the basic questions, relevant and related literature was reviewed. Sets of questionnaire (open and close – ended), interview, observation checklists and document review were used to gather the relevant data. The questionnaire were piloted and revised before the actual administration.

The total number of respondents who were expected to respond to the study questionnaires was 324. These questionnaires were distributed to the sample college's Instructors and trainees, out of which (295) were filled and returned to the researcher. In addition 3 college academic deans' consulted through interview.

- According to all instructor respondents (100%) the modules are prepared in student-centered approach. It invites students to be creative, and it prepares students for the world of work, etc. However, these objectives did not bring the required progress. Thus, it seems that a large gap exists between objectives in the modules and the implementation process.
- As to the major reasons accountable to low implementation of student-centered method, most instructors 20(60.6%) rated the following factors as the most serious ones:
 - large class size
 - Lack of resources
 - Shortage of time
 - Students perception
 - Influence of previous training
- As to instructors' perception, generally the result of the study revealed that, majority of the instructors had good understanding about student-centered methods and continuous assessment.
- The findings of the study disclosed that, the students had wrong perceptions towards the student-centered methods and continuous assessment techniques. The basic concepts that favour the student-centered methods were wrongly perceived by the students, where as concepts that didn't favour the methods were positively perceived.
- As far as the distribution of teaching materials and classroom setup were concerned, many instructors and students reported that, they are not suitable for the implementation of student-centered approach. For instance, modules are not correspond with the number of students, there are no sufficient laboratory equipments and chemicals, there are no professional lab technicians, there are no sufficient science reference books ('Afan Oromo' version) in the library and there are no professional librarians ... etc)
- Many educators agreed that the effectiveness of an instructional strategy highly depends on the adequacy of well-trained teaching staff. However,

most instructors 31(93.9%) do not get sufficient pre-service training concerning student-centered instructional strategies and continuous assessment techniques.

5.2 Conclusion

The practice of student-centered methods and continuous assessment requires human and material resources. Without fulfilling these essential elements, practicing them is difficult. Therefore, based on the findings the following conclusions are drawn.

- The study revealed that instructors are not using different strategies of student-centered methods. Rather, the instructors are using the old and traditional teacher-centered lecture method most of the time. The most commonly used student-centered strategy is the group work. But, the study disclosed that the method of applying group work is not based on the principles of using group work. Based on the above facts, the study concluded that, the student-centered approach of teaching learning process is not properly applied in science teaching in the selected sample Oromia Teachers colleges.
- From the findings, it can be concluded that the majority of instructors use similar assessment techniques (class work, homework, oral question) the practical skill assessment methods, (except lab report) are not used.
- The study found out that the use of assessment as a tool for learning is limited. Assessment needs to be part of a day-to-day teaching and learning. It should not be seen as an add-on activity. The finding also indicate that most instructors use assessment result for grading rather than identifying learning problems and assist students by adjusting their instruction. Assessment results for the purpose of feedback (for both instructors and students) are the neglected part of assessment in the sample colleges against the argument by many scholars that assessment should provide information to teachers for their own self-evaluation and evaluation of their students.

- The instructional resources that can facilitate the teaching-learning process are not sufficient in the sample colleges. According to the study, college facilities and classroom learning environment are not conducive to implement the student-centered approach and continuous assessment techniques.
- A great number of research findings showed that teachers' and students' attitude towards student-centered methods and assessment techniques could affect the practice either negatively or positively. The result of this study indicated that instructors of the sample colleges have positive attitude towards student-centered teaching methods and continuous assessment. However, the perception of students towards student-centered teaching methods and continuous assessment is not positive.
- Scholars based up on their research findings have noted that, the organization of the curricular materials could dictate the instructor to either achieve or not achieve the objectives. The findings revealed that the organization of the modules is good, but the practices of activities are not sufficient. In general, when seen against the envisaged objectives, student-centered methods and continuous assessment are not implemented by science instructors in the sample colleges.
- Generally, the major contribution of implementing student-centered methods and continuous assessment in improving the quality of education depends on the role of the teacher, who has enough experience, training, knowledge and skills in handling instructional methodologies in general and student-centered method in particular. However, the findings of this study confirmed that the practice of the student-centered strategies and continuous assessment techniques is poor in the sample colleges. Thus, it can be concluded that, Oromia Teachers colleges unsuccessful to equip the trainees with the necessary skills and knowledge to cope up with the interest of the students and develop problem solving capacity of the students. Moreover, it seems logical to conclude that instructors also failed to employ student-centered

instructional strategies and continuous assessment techniques as desired practically. Rather, they advocate the importance of the strategies theoretically.

5.3 Recommendations

- Though the instructors showed positive perception towards the student-centered methods and continuous assessment, their involvement in applying them is low. Therefore, it is necessary to devise mechanisms to address the issue of implementation. It is advisable that the science stream organizes seminars, workshops, panel discussions, experience sharing etc. in collaboration with the college on topics which could help them to implement and increase their dedication in practicing the student-centered strategies and assessment techniques.
- For the effective implementation of student-centered approach and continuous assessment willingness and positive reaction are important. Changing the attitude of the students is vital. Lack of interest can also negatively influence the practice of student-centered methods and assessment techniques. Thus, awareness creation for students on student-centered approach and continuous assessment should be carried out continuously.

Teachers, thus:

- Should try to change the attitude of the students towards student-centered methods and continuous assessment.
- Should motivate students to participate in the practice of student-centered approach and continuous assessment techniques.
- Should try to create conditions in which students learn in groups so that they can help each other. As a result, student can develop confidence, and through time engage themselves in actual practical activities. Once they acquire the interest to participate in different activities, they can easily involve in practicing different student-centered strategies.

 Conducive school facilities are very important for implementing student-centered method of teaching and continuous assessment. The physical

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- Conducive school facilities are very important for implementing student-centered method of teaching and continuous assessment. The physical environments in the colleges and in the classroom facilities are affecting the practice of student-centered methods and continuous assessment. Again the study revealed that the colleges have not conducive facilities for the application of student-centered methods and continuous assessment in science teaching. Thus, it seems important that the college administrators and other stakeholders play their part in improving facilities.
- The colleges should conduct follow-up study on a regular basis in order to identify problems that hinder the practice of student-centered method of teaching and continuous assessment and take actions accordingly.

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APENDIX A

Addis Ababa University
School of Graduate Studies
College of Education
Department of Curriculum and Teachers Professional Development Studies

Questionnaire filled by Instructors

Introduction

Dear respondents! The main purpose of this questionnaire is to collect relevant information about practice of student-centered methods and assessment techniques of teaching science in your college, identifying major obstacles that prevent them from implementing these methods and suggest possible recommendations based on the findings. So your sincere cooperation in answering each question is highly important. Individual data will be kept confidential.

Thank you in advance for your cooperation!

Note: No need of writing your name. Please give your responses to the questions as per the instruction given for each part, either by putting 'X' or short responses as required.

I. General Information

Direction: Please, select the appropriate answer and tick 'X' in the box or write your responses where necessary.

1. Name of the college _____

2. Sex A. Female ☐ B. Male ☐

3. Academic qualification

A. MSC/MED ☐ B. BSC/BED ☐ C. Diploma ☐ D. TTI ☐

If other (specify) _____

4. Area of specialization _____

5. Years of experience in teaching the subject

A. Less than 5 years ☐ B. 6-10 years ☐ C. 11-15 years ☐

D. 16- 20 years ☐ E. 21 Years and above ☐

6. How many courses do you teach in this semester? _____

7. How many section/s do you teach at present? _____

8. How many contact hours do you teach per week?

A. ≤ 5 ☐

B. 6-10 ☐

C. 11-15 ☐

D. 16-20 ☐

E. 21 and above ☐

9. On average, what is the class size of the sections you teach? _____

II. Questions.

Direction: Please, select the appropriate answer based on your experiences and tick 'X' in the box or write your response when necessary.

10. What was the focus of your pre-service training?

A. Academic content ☐

B. Teaching methods ☐

C. Teaching Practice ☐ Other (specify) _____

No	Items	Yes	No
11	Have you ever taken any teaching professional course?	☐	☐
12	Have you ever taken a course 'general methods of teaching'?	☐	☐
13	Have you taken a course 'subject area methodology'?	☐	☐
14	Have you ever been trained on how to use 'student-centered method of teaching'?	☐	☐

15. If your answer to question no 14 is 'yes' how often do you apply student-centered instructional strategies in your class?

A. Always ☐

B. Often ☐

C. Sometimes ☐

D. Rarely ☐

E. Not at all ☐

16. If you fail to use student-centered methods, usually, please rank the reasons from severe to moderate (9 to 1) among the following lists.

No	Item	Rank
a	Course organization dose not encourage	
b	Nature of the course	
c	Lack of awareness	
d	Large number of students in a class	
e	Lack of facilities	
f	Shortage of time	
g	Lack of pedagogical skill	
h	Students' attitude	
i	Lack of leadership commitment	

If other (specify) _____

17. Are the modules prepared in student centered methods?

A. Yes ☐

B. No ☐

18. How do you evaluate the relationships (match) of the suggested teaching methods (such as problem-solving, discussion, project, discovery methods etc), in the module of your course and the actual practices in your class rooms?

A. Very strong match ☐

B. Strong match ☐

C. Weak match ☐

D. Very weak match ☐

E. No match at all ☐

19. If your answer to the above question is weak match (N.B. Weak match, Very weak match, No match at all) what is the reason? Please rank the reasons from severe to moderate (4to1).

No	Items	Rank
a	Lack of facilities	
b	Lack of resources	
c	Large number of students	
d	Shortage of time	

If other (specify) _____

19. Did you choose science based on your interest?

A. Yes ☐ B. No ☐

20. If yes what factors initiated you to become a science teacher?

A. By chance ☐

B. Encouragement from science teachers ☐

C. Good job opportunity ☐

D. Personal interest in being science teacher ☐

If other (specify) _____

21. If No, what are your reasons? _____

22. Are you satisfied in your present practice in science teaching?

A. Yes ☐ B. No ☐

23. If your response for the above question is No, what is the reason? Please rank the reasons from severe to moderate (7to1).

No	Items	Rank
a	Teaching science is difficult	
b	Science teaching requires doing practical work which I can not do for various reasons	
c	The salary is not motivating	
d	Preparing for teaching is tire some	
e	Most of the students are not interested to learn science	
f	I am not interested in teaching at all	
g	No incentive for additional work	

If other (specify) _____

24. Are the general objectives of the policy reflected in the objective of your subject courses? (See the general objectives of the policy from attachment)

A. Yes ☐ B. No ☐

25. If your response to the above question is yes, to what extent are they reflected?

A. Very high ☐ B. High ☐ C. Average ☐ D. Low ☐
 E. Not at all ☐

26. Are the general objectives of TESO program reflected in the objectives of your subject? (See the general objectives of TESO program from the attachment)

A. Yes ☐ B. No ☐

27. If your response is ‘yes’ to the above question, to what extent are they reflected?

A. Very high ☐ B. High ☐ C. Average ☐ D. Low ☐
 E. Not at all ☐

III. Items related to the type of Student-centered methods practice

28. Some of the items related to your experiences on the application of instructional methods are listed below. Please, mark 'X' in the space provided in accordance to your application of the strategies or methods. (N.B. 5 = Always, 4 = Often, 3 = Sometimes, 2 = Rarely, 1 = Not at all)

No	Items	5	4	3	2	1
a	Explanation/ Teacher dominating lecture					
b	Group work					
c	Cooperative method					
d	Problem solving					
e	Discovery method					
f	Project method					
g	Field trip					
h	Role –play					

IV. Items related to Students Attitude

29. Using the 5-scale rating scales below, please rate the following statements using a tick 'X' mark. (N.B. 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2= Disagree, 1= Strongly Disagree)

No	Items	5	4	3	2	1
a	The majority of my students are less motivated to put extra effort to achieve the course objectives.					
b	Most of my students often not eager to do assignment and projects.					
c	The majority of my students are willing to spend time in the laboratory to do practical works.					
d	Most of my students are willing to spend more time to do class work and home work.					

V. Items related to Availability and adequacy of Resources

30. Using the 5-scale rating scales below, please rate the following statements using a tick 'X' mark. (N.B. 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly Disagree)

No	Items	5	4	3	2	1
a	There are adequate modules available for teaching my subject.					
b	There are adequate laboratory equipments for teaching my subject.					
c	The laboratory space is enough to accommodate my students during lab sessions.					
d	There are sufficient reference books in the library related to my subject.					
e	The library facilities are motivating students for reading.					
f	There are sufficient desks and chairs in my classrooms.					
g	There are notice board and black board for different activities in my class rooms.					
h	There are adequate teachers for teaching my subject.					
i	There are available and adequate lab. technicians for teaching my subject.					
j	There are available and adequate librarians in the library.					

VI. Items related to Assessment Techniques used and follow-up

31. Using the 5-scale rating scales below, please rate the following statements using a tick 'X' mark. (N.B. 5 = Always, 4 = Often, 3 = Sometimes, 2 = Rarely, 1 = Not at all)

No	Items	5	4	3	2	1
a	How often do you asking questions, giving class works, home works and assignments with open-ended questions?					
b	How often do you check your students home works, class works and assignment and give them constructive feedback?					
c	How often do you evaluate your students' group cooperation?					
d	How often the majority of your tests and exams focus on recalling of facts, theories and formulae?					
e	How often do you use different assessment techniques to gather data about students' learning?					
f	How often do you accept feedbacks from your students?					

VII. Items related to the types of Assessment techniques Practiced

32. In the table below indicted by 'X' the assessment methods used to asses your students learning. (N.B. 5 = Daily, 4 = Every two or three days, 3 = Every week, 2 = Twice in a semester, 1 = Once in a Semester)

No	Items	5	4	3	2	1
a	How often do you give class work /individual and/or group works?					
b	How often do you give home work?					
c	How often do you made observation on students work?					
d	How often do you assess students' laboratory work?					
e	How often do you ask students oral question?					
f	How often do you assess students' demonstration (project work)?					
g	How often do you give classroom tests/quizzes to your student?					

If other (please mention) _____

VIII. Items related to Teachers' perception

33. Some of the major factors that may influence teachers' perception about student-centered method are listed below. Please, mark 'X' in the space provided in accordance to the given alternative. (N.B. 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2= Disagree, 1= Strongly Disagree)

No	Items	5	4	3	2	1
a	A good teacher is some one who prepares notes for study from textbook.					
b	Learning occurs when students are silent and listen to their teachers.					
c	Students should take self-responsibility for their own learning.					
d	Student-centered method makes the teacher free and makes the students busy.					
e	Learning becomes meaningful when students discover knowledge rather than receiving from the teacher.					
f	Students learn more when each and every activity is done by the teacher in the classroom/over reliance in teacher.					
g	Student initiation is decisive for teaching learning process.					
h	Teachers should not give assignment on issues that are new to students.					
i	Students should freely express their ideas in the classroom.					
j	Group work can strengthen learners' friendship and facilitate learning.					
k	The teacher has to guide students to learn rather than teaching every thing.					
l	Students learn more when what they learn is related to their environment.					

34. What are your suggestions and recommendations with regard to the improvement of student-centered methods and assessment techniques of science courses?

i. Student-centered methods:

ii. Assessment techniques:

APENDIX B

Addis Ababa University
School of Graduate Studies
College of Education
Department of Curriculum and Teachers Professional Development Studies

Questionnaire filled by Students

Introduction

Dear respondent! The objective of this Questionnaire is to collect information about the practice of student-centered methods and assessment techniques of teaching science in your college. Please be objective and complete in your answers.

Thank you in advance for your cooperation!

Note: No need of writing your name. Please reply to questions as per the instruction given for each part, either by putting 'X' or short responses as required.

I. General Information

Direction: Please, select the choice that reflects your opinion and replay by putting 'X' or write your response when necessary.

1. Name of the college _____
2. Sex A. Female ☐ B. Male ☐
3. Age A. Less than 16 years ☐ B. 17-19 years ☐ C. 20 years and above ☐
4. Major area _____ Year _____

II. Questions

Direction: Please, select the choice that reflects your opinion and reply by putting 'X' or write your responses where necessary.

5. How often do your science instructors use varieties of teaching methods/strategies (for example problem-solving, discussion, project, discovery methods etc) in teaching?
A. Always ☐ B. Often ☐ C. Some times ☐ D. Rarely ☐
E. Not at all ☐

6. How often do your science instructors focus on teacher dominated lecture method?

- A. Always ☐ B. Often ☐ C. Some times ☐ D. Rarely ☐
E. Not at all ☐

7. How often do your science instructors focus mainly on practical application of the courses?

- A. Always ☐ B. Often ☐ C. Some times ☐ D. Rarely ☐
E. Not at all ☐

8. How often do your science instructors take you out of college for related topics?

- A. Always ☐ B. Often ☐ C. Some times ☐ D. Rarely ☐
E. Not at all ☐

III. Items related to the Types of Student-centered methods practiced

11. Some of the items related to your science instructors on the application of instructional methods are listed below. Please, mark 'X' in the space provided in accordance to your science instructors' application of the strategies or methods. (N.B. 5 = Always, 4 = Often, 3 = Sometimes, 2 = rarely, 1 = Not at all)

No	Items	5	4	3	2	1
a	Explanation/ teacher dominating lecture					
b	Group work					
c	Cooperative method					
d	Problem solving					
e	Discovery method					
f	Project method					
g	Field trip					
h	Role –playing					

9. Others specify _____

IV. Items related to the Availability and Adequacy of Resources

10. Using the 5-scale rating scales below, please rate the following statements using a tick 'X' mark. (N.B. 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2 = Disagree, 1 = Strongly Disagree)

No	Items	5	4	3	2	1
a	The majority of students in my department have modules of science courses.					
b	There are adequate laboratory equipments in the science lab.					
c	The laboratory space is enough to accommodate students during lab sessions.					
d	The college has sufficient reference books for the science courses.					
f	The library facilities are motivating students for reading.					
g	There are sufficient desks and chairs in my classroom.					
h	There are notice board and black board in my classroom for different activities.					

V. Items related to Assessment techniques used and follow-up

9. Using the 5-scale rating scales below, please rate the following statements using a tick 'X' mark. (N.B. 5 = Always, 4 = Often, 3 = Sometimes, 2 = rarely, 1 = Not at all)

No	Items	5	4	3	2	1
a	How often do your science instructors asking questions, give you class works, home works and assignments with open ended questions?					
b	How often do your science instructors check home works, class works, and assignment and give you constructive feedbacks?					
c	How often do the science instructors willing to evaluate your group cooperation regularly?					
d	How often the majority of tests and exams you took focus on recalling of facts, theories and formulae?					
e	How often your science instructors used different assessment techniques to gather data about students' learning?					
f	How often do science instructors willing to accept feedbacks from students?					

VI. Items related to the types of Assessment Practiced

12. In the table below Please, mark 'X' in the space provided in accordance to the given alternative the assessment methods used by your instructors. (N.B. 5 = Daily, 4 = Every two or three days, 3 = Every week, 2 = twice in a semester, 1 = Once in a Semester)

No	Items	5	4	3	2	1
a	How often your science instructors give you class work (individual) and/or group works?					
b	How often your science instructors give you home work?					
c	How often your science instructors made observation on students work?					
d	How often your science instructors assess students' laboratory work?					
e	How often your science instructors ask students oral question?					
f	How often your science instructors assess students' demonstration (project work)?					
h	How often your science instructors give classroom test /quizzes?					

Other specify _____

VII. Items related to Students' Perception

13. Some of the factors that may influence trainees' perception about student-centered method are listed below. Please, mark 'X' in the space provided in accordance to the given alternatives. (N.B. 5 = Strongly Agree, 4 = Agree, 3 = Undecided, 2= Disagree, 1= Strongly Disagree)

No	Items	5	4	3	2	1
a	A good teacher is someone who prepares notes for students from textbook.					
b	Learning occurs when students are silent and listen to their teachers.					
c	Students should take self-responsibility for their own learning.					
d	Student-centered method makes the teacher free and makes the learner busy.					
e	Learning is meaningful when students discover knowledge rather than receiving from the teacher.					
f	Students learn more when each and every activity is done by the teacher in the classroom.					
g	Student motivation is decisive for teaching learning process.					
h	Teachers should not give assignment on issues that are new to students.					
i	Students should freely express their ideas in the classroom.					
j	Group work can strengthen learners' friendship and facilitate learning.					
k	The teacher has to guide students to learn rather than teaching every thing.					
l	Students learn more when what they learn is related to their environment.					

14. What are your suggestions and recommendations with regard to the improvement of student-centered methods and assessment techniques of science courses?

i. Student-centered methods:

ii. Assessment techniques _____

APENDIX C

Addis Ababa University
School of Graduate Studies
College of Education
Department of Curriculum and Teachers Professional Development Studies

Interview for Academic Deans

Introduction

Dear respondent! The objective of this interview is to collect information about the practice of student-centered methods and assessment techniques of teaching science in your college. Please be objective and complete in your answers.

Thank you in advance for your cooperation!

1. Name of the college _____
2. Years of service on the position _____
3. Field of specialization _____
4. Educational qualification _____
5. Sex _____
6. What is your opinion about
 - A. The equipment in the science laboratory.
 - B. The reference books in library.
 - C. The availability and adequacy of science teachers, lab technicians and librarians in your college.
7. What are the instructional methods that the instructors often use?
 - i) What is the teachers' perception about student-centered approach?
 - ii) What is the teachers' perception about continuous assessment?
 - iii) What is the students' perception about student-centered approach?
 - iv) What is the students' perception about continuous assessment?
8. What are your suggestions and recommendations with regard to the improvement of student-centered methods and assessment techniques of science courses?

APENDIX D

Addis Ababa University
School of Graduate Studies
College of Education
Department of Curriculum and Teachers Professional Development Studies

Classroom Observation Check List

I. Classroom facilities

No	Items	Yes	No
a	Desks and chairs are movable		
b	Free space to facilitate different sitting arrangement		
c	Notice board and black board for different activities		
d	Table for different activities		
e	The class composed of greater than 40 students		

II. Organizing classroom instruction

No	Items	Applied very well	Applied to some extent	Not applied at all	Remark
a	Students working together cooperatively in groups, on work given by the teacher.				
b	Teaching directed at class divided into groups.				
c	Teaching directed at whole class.				
d	Teacher varies grouping, whole, small, and individual.				
e	Pupils working individually, at their own pace, on work given by the teacher.				

III. Teacher activities

No	Items	Applied very well	Applied to some extent	Not applied at all	Remark
1	Clarifies the learning objectives.				
2	State the topic, with out clarifying.				
3	Assess learners' prior knowledge and experience before starting the subject matter.				
4	Teacher helps learners rounding the group.				
5	Give directions about the procedures and activities the student should carry out.				
6	Encourage the learners to participate.				
7	Points out learners mistake directly.				
8	Teacher focuses on controlling discipline being alien, when learners work in group.				
9	Making the class democratic and interactive.				
10	Teacher reacts constructively to students feeling and attitudes.				
11	Teacher points out learners mistake indirectly or in formative way.				

IV. Students activities

No	Items	Applied very well	Applied to some extent	Not applied at all	Remark
1	Pupils tend to express their needs and feelings more freely.				
2	Students' interaction with teacher.				
3	Student-student interaction.				
4	Willingness to participate in group works.				
5	Discussing in groups.				
6	Willingness to freely express ideas on different issues.				

V. Assessment

No	Items	Applied very well	Applied to some extent	Not applied at all	Remark
1	Give class work or homework besides assignment or project works				
2	Teacher checks student's progress regularly and adjust instruction accordingly				
3	Evaluate group cooperation regularly				
4	Use different assessment techniques.				
5	Provide constructive feedback to students.				

APENDIX E

Yuunivaristii Addis Ababaattii

Mana Barumsaa Digrii Lammaffa

Muummee Sirna Barnootaafi Qu'annoo Dagaagina Ogummaa Barsiisotaa

Bargaaffii Barattootaan Guutamu

Qajeelfama

Kaayyoon bargaaffii kanaa kolleejjii kessan kessatti tooftaa baruu-barsiisuu isa barataa giddu-galeeffateefi tooftaa abbalittiin ittiin geggeeffamu adeemsa barnootaa saayinsii barsiisuu keessatti maal akka fakkaatu odeeffannoo walitti qabuudha. Kanaafuu gaaffileedhaaf deebii sirri fi gutuu akka kennitan kabajaadhaan isin gaafadha.

Deeggarsa keessaniif dursee isin galateeffadha.

Hubachiisa: Maqaa keessan barreessuun hinbarbaachisu

- Gaaffileedhaaf deebii akka qajeelfa, tanitti mallattoo 'X' ykn deebilee gaggabaaboo barreessuudhaan kennaa.

I. Odeeffannoo Waliigalaa

Qajeelcha. Filannoo yaada kee ibsu filachuun mallatto 'X' kaa'uun ykn iddoo barbaachisaatti yaada gabaabaa barreessuun deebisi.

1. Maqaa Kolleejjii _____

2. Saala A. Dubara ☐

B. Dhiira ☐

3. Umrii A. Waggaa 16 fi gadi ☐

B. Waggaa 17-19 gidduu ☐

C. Waggaa 20 fi ol ☐

4. Barnoota Hangafaa(Meejarii) _____

Waggaa _____

II. Gaafilee

Qajeelcha: Gaafilee dhiyaataniif filannoo yaada kee mul'isu biratti saanduuqa keessa mallatto 'X' kaa'uudhaan ykn yoo barbaachisaa ta'e barreessuudhaan deebisi.

5. Barsiisonni saayinsii yammuu barsiisan tooftaa baruu-barsiisuu adda addaa (fakkeenyaaf, mala rakkoo hiikuu, mala marii, piroojeektii, mala argannoofi k.k.f.) hangam tokko fayyadaman?

- A. Yeroo hunda ☐ B. Gara irra caalu ☐ C. Yeroo tokko tokko ☐
D. Darbee darbee yeroo tokko tokko ☐ E. Tasumaa hin fayyadaman ☐

6. Barsiisonni saayinsii si barsiisan hangam tokko mala od-ibsaa barsiisaa giddugaleefate irratti xiyyeeffatu?

- A. Yeroo hunda ☐ B. Gara irra caalu ☐ C. Yeroo tokko tokko ☐
D. Darbee darbee yeroo tokko tokko ☐ E. Tasumaa hin fayyadaman ☐

7. Barsiisonni saayinsii si barsiisan hangam tokko koorsilee si barsiisan akka odeeffannoo baratte ittin shaakaltu sii taasisu?

- A. Yeroo hunda ☐ B. Gara irra caalu ☐ C. Yeroo tokko tokko ☐
D. Darbee darbee yeroo tokko tokko ☐ E. Tasumaa hin fayyadaman ☐

8. Barsiisonni saayinsii si barsiisan hangam tokko direetti isiin baasuudhaan waan goolatti barattan haala naannoo qabatamaa waliin akka wal-qabsiistan sii taasiisu?

- A. Yeroo hunda ☐ B. Gara irra caalu ☐ C. Yeroo tokko tokko ☐
D. Darbee darbee yeroo tokko tokko ☐ E. Tasumaa hin fayyadaman ☐

III. Akaakulee tooftaalee baruu-barsiisuu kan barattoota giddu galeeffatan.

11. Tooftaaleen barattoota giddugaleeffatn kessaa barsiisonni saayinsii ittifayyadaman jedhamanii yaadaman muraasni tarreeffamanii jiru. Akkaataa itti fayyadama barsiisota kettitin bakka siif kennamerratti mallatto 'X' kaa'uudhaan deebisi. (Furtuu Lakkofsi 5 = Yeroo hunda, 4 = Yeroo baay'ee, 3 = Yeroo tokko tokko, 2 = Darbee darbee yeroo tokko tokko, 1 = Tasumaa hinraawatan yaada jedhu bakka bu'u)

Lak.	Tooftalee Barattoota giddu-galeeffatan	5	4	3	2	1
a	Mala od-ibsa barsiisaa giddu-galeeffatan					
b	Mala hujii garee					
c	Mala walgargaaruun barachuu					
d	Mala rakkoo-hiikuu					
e	Mala argannoo					
f	Mala pirojeektii					
g	Mala dirreetti ba'uun barachuu					
h	Mala ga'ee taphachuu					

Malli biro yoo jiraatan barreessi _____

IV. Gaafilee Jiraachuu fi Ga'uumsa Qabeenyaa waliin walqabatan

10. Yaadota gabatee itti aanu keessa jiraniif deebii kee mallattoo 'X' fayyadamuudhaan deebisi. (Furtuu Lakkofsi: 5 = Sirritti waliigalla, 4 = Waliigalla, 3 = Murtessuf narakisa, 2 = Waliingallu, 1 = Gonkuma waliingallu)

LK.	Yaadota	5	4	3	2	1
a	Barattoonni baay'ee muummee kiyyaa moojuloota koorsiilee saayinsii ni qabu.					
b	Gola laaboraatoorii keessa meeshaalee barbaachisan ga'aatu jiran.					
c	Golli laaboraatoorii barattota mara kessumsiiisuuf ga'aa dha.					
d	Kolleejjiin koorsilee saayinsiitiif kitaabilee wabii ga'aa qaba.					
f	Tajaajjilli mana kitaabaa kan barattoonni akka dubbisaniif kakaasuu dha.					
g	Gola keenya keessa minjaalaafi tessoo ga'aatu jira..					
h	Gola keenya keessa gabatee guraachaafi gabateen odeeffannoo ni jiru.					

V. Gochaalee itti fayyadama toftaalee Madallii wajjin walqabatan

9. Yaadota armaan gadii dubbissuudhaan deebii kee mallattoo 'X' saanduuqa keessa kaa'i. (Furtuu Lakkofsi 5 = Yeroo hunda, 4 = Gara irra caalu, 3 = Yeroo tokko tokko, 2 = Darbee darbee yeroo tokko tokko, 1 = Tasumaa hinraawatan yaada jedhu bakka bu'u)

Lak	Gaaffilee	5	4	3	2	1
a	Barsiisonni saayinsii si barsiisan hangam tokkogafilee, hujiilee golaa, hujiilee manaafi abbaltiilee yaada hindaageeffamneen deebistan isinitti kennu?					
b	Barsiisonni saayinsii si barsiisan hangam tokko hujiilee golaa, hujiilee manaafi abbaltiilee isinitti kennan sirreessun yaada isiin cimsu isiniif laatu?					
c	Barsiisonni saayinsii si barsiisan hujii isin gareedhaan walgargaartanii hojjatan hangam tokko madaalu?					
d	Gaafileen battalee fi qormaata dhumaarratti fudhatte hangam odeeffnolee, yaaddidamaafi foormuloota golatti barattan isin yaadachiisu?					
e	Barsiisonni saayinsii si barsiisan hangam tokko tooftaalee madaallii adda addaa fayyadamuun waa'ee haala barataan itti baratuu beekuu fedhu?					
f	Barsiisonni saayinsii si barsiisan hangam tokko barattootarraa yaada fudhachuu barbaadu?					

VI. Akaakulee tooftaalee Madaallii rawwatamaniin wal-qabatan.

12. Gabatee itti aanu keessatti akaakulee madallii kan barsiisoonni sayinsii itti fayyadamu jeedhamanii yaadamanii dha. Akaakulee madaalii barsiisonni saayinsii kee fayyadaman iddoo siif kennamerratti mallattoo 'X' fayyadamuudhaan agarsiisi. (Furtuu 5 = Guyyaa guyyaan, 4 = Guyyaa lama lamaan ykn guyyaa sadi sadiin, 3 = Torbaan torbaaniin, 2 = Seemiistaraatti al lama, 1 = Seemiistaraatti al tokko).

Lak.	Tooftaalee madaallii	5	4	3	2	1
a	Hangam tokko barsiisoonni saayinsii hojii golaa (dhuunfaan ykn gareen) isiniif kennu?					
b	Hangam tokko barsiisoonni saayinsii hojii manaa isiniif kennu?					
c	Hangam tokko barsiisoonni saayinsii hojii barataa irratti doowwii gaggeessu?					
d	Hangam tokko barsiisoonni saayinsii hojii/ Yaalii laaboraatoorii madaalu?					
e	Hangam tokko barsiisoonni saayinsii barattoota gaafilee afaanii gaafatu?					
f	Hangam tokko barsiisoonni saayinsii agarsiifama/ Hojii piroojektii barattootaa madaalu?					
g	Hangam tokko barsiisoonni saayinsii battalee gola keessaa qoru?					

Kan biroo yoo jiraatan barreessi _____

VII. Goosootaa Hubannoo barattootaa wajjin walqabatan.

13. Wantoonni hubannoo barattootaarratti dhibbaa ni qabu jedhamanii yaadaman gabatee itti aanu keessatti tarreeffamaniiru. Yaadota kanneen dubbisuudhaan iddoo siif kenname irratti deebii kee mallattoo 'X' fayyadamuudhaan agarsiisi. (Furtuu: 5 = Sirritti waliigalla, 4 = Waliigalla, 3 = Murtessuf narakisa, 2 = Waliihingallu, 1 = Gonkuma waliihingallu)

Lak.	Yaadota	5	4	3	2	1
a	Barsiisaan gaariin kan barattootaaf yaadannoo(note) kitaaba keessaa qopheessuudha.					
b	Barnoonni kan gaggeefamu yoo barattoonni cal'isannii barsiisaa isaanii waan jedhu cagasaniidha.					
c	Barattoonni barnoota barataniif itti gaafatamummaa fudhachuu qabu.					
d	Malli barataa giddu galeeffate kan barsiisaa bilisa taasisuufi kan barattootatti hujii baay'isuudha.					
e	Barnoonni kan sirritti baratamu yoo barattoonni beekkumsa argachuuf tattaaffii godhan malee barsiisuma qofa irraa eggatanii miti.					
f	Barattoonni kan sirriitti baratan yoo gola keessatti hujii hunduu barsiisaadhaan hojjatameedha.					
g	Kaka'umsi barattootaa adeemsa baruu-barsiisuutiif baay'ee murteessaadha.					
h	Barsiisonni barattootaaf yaadoota haaraa akka abbaltiitti itti kennuu hin qaban.					
i	Gola keessatti barattoonni yaada isaanii bilisaan ibsachuu qaban.					
j	Hujiin garee kan hiriyyummaa barattootaa cimsuufi barnoota barachuudhaaf haala mijeessuudha.					
k	Barsiisaan barattoota qajeelchuu qaba malee waan hundaa barsiisuu hin qabu.					
l	Barattoonni kan sirriitti baratan yoo wantti isaan baratan wantoota naannoo isaaniitiin wal qabataniidha.					

14. Yaada deggeersaa mala baruu-barsiisuu barataa gidduugaleeffateefi tooftaalee madaallii koorsii saayinsii cimsuuf gargaaran jettee yaadu barreessi.

i. Mala baruu-barsiisuu barataa giddug _____

ii. Tooftaalee madaallii:

DECLARATION

This thesis is my original work and has not been presented for a degree in any other university and that all sources of materials used for the thesis are acknowledged.



Dereje Abdi

This Thesis has been submitted for examination with my approval as university adviser.



Dr. Temesgen Fereja