

STUDENTS' PERCEPTION OF INSTRUCTIONAL TASKS AND
MATHEMATICS ACHIEVEMENT: THE CASE OF SOME SELECTED
GOVERNMENT SECONDARY SCHOOLS IN NEFAS SILK-LAFTO
SUB CITY, ADDIS ABABA.

BY

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Master of education (M.Ed) Thesis

Department of mathematics education

ADDIS ABABA UNIVERSITY

SCHOOL OF GRADUATE STUDIES

COLLEGE OF EDUCATION AND BEHAVIORAL STUDIES

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ABSTRACT

The purpose of the study was to assess students' perception of instructional task and mathematics achievement in nefas silk lafto sub city, Addis Ababa. It was also to investigate major factors that influence students' perception of instructional tasks in grade 10 mathematics learning. Out of six government high schools three of them were taken as sample by cluster sampling techniques. In each school all of the students in one section were included in the study by cluster sampling techniques. Among those students some of them were selected by purposive sampling techniques for interview. Mathematics teachers and principals were also selected by purposive sampling techniques. A method used was descriptive survey method. Four basic research questions about the students' perception of instructional tasks and mathematics achievement, one question about the major factors that influence students' perception of instructional tasks and mathematics achievements were treated. Perception scale, achievement test and interviews were used as data collecting instruments. The result of the study revealed that students' perception of individual tasks had on significant impact on students' mathematics achievement. The study also indicates that Students and teachers interest in implementing instructional tasks in mathematics learning were unfavorable and some basic factors were identified. Finally, some possible recommendations are made based on the findings of the study so as to see favorable perception of students and effective implementation of instructional tasks in mathematics teaching and learning process.

Key words: perception, instructional task, components of instructional task, achievement

CHAPTER ONE

INTRODUCTION

1.1 BACKGROUND OF THE STUDY

The aim of learning is always to enable the learner to do something which he could not do at the beginning of the learning process. Thus, learning is an individual process. Each learner must actively participate in the lesson in class room. If a person has confidence in his or her own ability within a specified area, then that person is much more apt to be motivated to achieve in that area (Combos, 1985).

Although the Ethiopian school curriculum gradually changed in objectives, contents, methods through time, there has always been complaint about its impact on children. In addition to this some experts in the field underlying that a school curriculum which do not reflect the needs and interests of the society in general and that of the learners in particular is one of the major causes for low attendance and withdrawal of students from schools (Cruel, 1993; Simons, 1980) as seen by Bedlu (1998).

To play these vital roles, students should be given the opportunity to develop or practice problem solving skills in schools. This obviously requires interactive situation and the application of problem solving strategies and other independent learning approaches. To this end, a major paradigm shift in teaching methods and strategies are expected. This is to bring about the implementation of modern instructional strategies which are generally known as student-centered strategies. Some of these modern instructional strategies include problem-based learning, the inquiry method, the discovery method, that involve instructional tasks like project works, class works, home works, group works and etc.

According to Plass (1998:3) much of learning is task based and involves activities which have clear learning objectives and leads to an outcome, such as the solution of problems. That means, tasks represent samples of the students activities that students may be asked to do to support the specified learning objectives. Supporting this idea, Cole (1994:254) stated that appropriate learning activities extend students knowledge and understanding of relevant subject matter.

Teachers provide students with useful learning experiences and opportunities to consolidate their learning. When completing assigned tasks, students are required to focus their attention on particular aspects of subject matter or use various operations or techniques that they have learned. However, it is not enough for students to acquire specific knowledge and skills, they also need to be able to apply the acquired knowledge to solve problems of similar kind and utilize it in unraveling life problems. Teacher assign work tasks to allow students to generalize and transfer acquired learning to new and different contexts. This description of learning represents the nature of learner centered approach. In other words, when the learner is given the chance to actively engage in the learning process, learning becomes more meaningful and relevant to the learner.

According to Mc Combs and Whisler (1997:9) as cited by Bedelu (2004:20) learner centered is a perspective that couples a focus on individual learners (their heredity, experiences, perspectives, backgrounds, talents, interests, capacities and needs) with a focus on learning (the best available knowledge about learning) and how it occurs and about teaching practice that are most effective in promoting the highest level of motivation, learning and achievement for all learners. This means, teachers are expected to motivate learners and help every student in their classroom to perform as much as possible. In such a situation learners feel that they are part of the school system and hence actively participate in the educational process. That is why Silberman (1996) stated that active learning approach is a learner-centered method that gives due emphasis to the learner to be an actor in learning and searching solutions rather than to be dependent only on teacher.

An active learning environment requires students and teacher to commit to a dynamic partnership in which both share a vision of responsibility for instruction. In relation to this, ICDR(1996:71) stated that, in active learning student not only receive information from lectures and books, but they also collect information, record it systematically, discuss it, analyze it, draw conclusions from it and communicate about it. Thus, the emphasis in teaching has shifted from transmission of facts or information to teaching

learners how to learn, how to find information for them. That means constructivism places the learner in the center of the learning process.

However, the implementation of such learner-centered approach essentially requires the collaboration of different bodies. Teachers for instance, are the final decision makers in the actual learning. Students' awareness, interaction, perception and reaction are also vital. According to the teachers guide for grade 10 mathematics teaching, even though different research works have been done about the implementation and status of active learning strategies in the country, to the knowledge of the researcher the perception of students' towards those instructional strategies is not adequately studied so far. Thus, it is the intention of this study to assess the students' perception of instructional tasks in mathematics learning and mathematics achievement and to investigate the factors that may influence students' perception of instructional task assignments. In the light of the above arguments and the fact that no research of this kind has been made on our school system, the assessment in to the practice of instructional task assignments seems in order.

The researcher of this study believes that learning mathematics means doing mathematics. According to Henningsen and Stein (1997) what it means to 'do mathematics', or to 'behave mathematically', for students, is largely dependent on the nature of the tasks and activities students are engaged in, and these in turn 'color' their perceptions of the subject. Thus, doing mathematics, and developing certain perceptions of the subject, is likely to 'produce' particular 'mathematical dispositions' or a 'mathematical point of view' (Schoenfeld, 1988), as well as acquiring mathematical knowledge. (p.525)

Hiebert et. Al. (1997) similarly argues Students' perceptions of the subject are built from the kind of work they do, not from the exhortations of the teacher. The tasks are critical. (p.17-18). Moreover, he asserts that the kinds of tasks that students are asked to perform set the foundation for the system of instruction that is created. Different kinds of tasks lead to different systems of instruction. (p.7) It appears that mathematical tasks are central to student learning, their developing perceptions of what the mathematics is and what doing mathematics entails.

This study is, therefore, designed to investigate the contribution of perception of instructional tasks to students' achievement and to examine the major factors that may influence students' perception of instructional tasks in government high schools of Nefas Silk-Lafto sub city, southern Addis Ababa.

1.2. STATEMENTS OF THE PROBLEM

The new instructional approach known as active-learning method is promoted in many countries including Ethiopia, today. As indicated in the Education and Training Policy document (1994), the previous curriculum design and instructional processes suffered from old and traditional approach. There have been continuous revisions in the instructional approaches to offer quality training and make the active learning practical.

The curriculum reform initiated in Ethiopia after the adoption of the education and training policy (1994) has to the extensive change in education. One of the changes is the paradigm shift in the mode of teaching and learning which involves the shift from **rote learning to participatory active learning** and a shift **from linear curriculum to an integrated one** in the lower grades (leu, 1998:1). This change has brought a major paradigm shift in our thinking about education, and in the meaning of knowledge and learning.

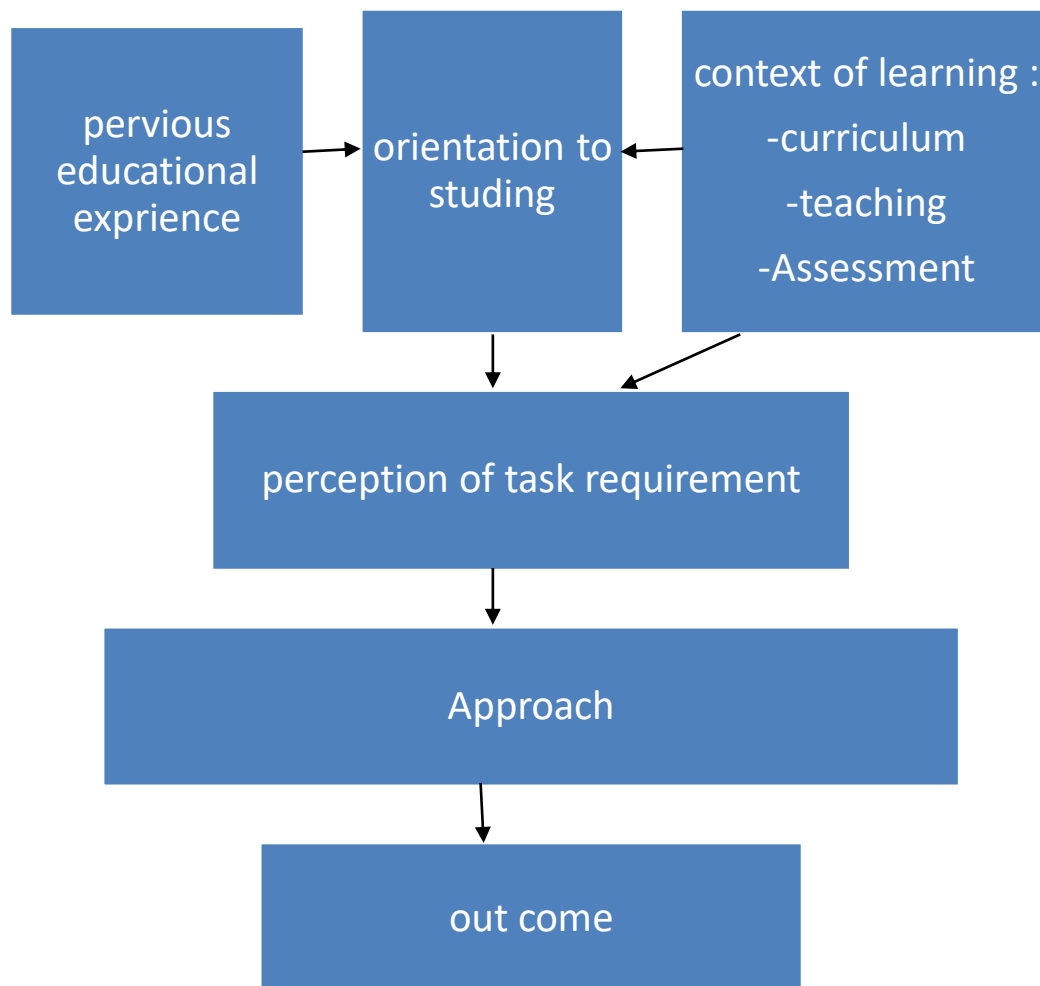
As stated in MOE (1994:7) one of the basic objectives of education is to develop the physical, mental and problem-solving capacity of individuals by expanding basic education for all. Based on this objective, active learning is getting acceptance and there is a tendency to change traditional method (teacher centered) of teaching which emphasize active learning.

The intention of the reform is to practice the new active learning instructional methods like gaped lecture, discovery learning group discussion, debate, problem solving, field trip, panel discussion, individual tasks like: class work, home work, assignment, project work, presentation etc and group tasks like group assignment, group discussion, project work etc in schools. However the implementation of these instructional techniques requires the collaborations of people and materials. That means, the implementation of such new instructional methods depends up on the perception of teachers, students,

school management, supervisors, curriculum experts and community at large including parents.

According to Barlow (1997:60) as seen Ambissa (2009) much of the failure in students learning is explainable in terms of the approach students' adapt in their learning.

Barlow wrote that "in deciding their approach, students are influenced both by their own motivation and previous experiences, and (crucially) by what they perceive as being required," The point of this writer indicate why the students come to the school, the type of learning approach they have been exposed to during their schooling (pre-high school) and the requirement of high schools. The following figure shows a diagrammatic representation of how students develop approaches to learning.



Source: Barlow (1997, p.60) adapted from Ramsdon (1992, p83) as seen by Ambissa (2009)

But the researcher of this study is doubtful whether or not the underlying ideas or the paradigm shift in the methods of instruction is implemented as intended may be due to different resistances like teachers, students, school management, parents, community and unfavorable classroom setup, infrastructure, supply of materials, etc.

Among these, this study is emphasized the students` perception of instructional tasks such as individual and group tasks like home work, class work, project work, group work, etc which is leveled at the fourth stage of the above model. Because this is the stage how students think about mathematics and come to understand its meaning. This problem is raised from the researcher learning and seven years of teaching experiences of students` perception of instructional tasks. Indeed, Henningsen and Stein (1997) assert that the tasks in which students engage provide the contexts in which they learn to think about subject matter, and different tasks may place different cognitive demands on students.

Thus, the nature of tasks can potentially influence and structure the way students think and can serve to limit or to broaden their views of their subject matter with which they are engaged. Students develop their sense of what it means to “do mathematics” from their actual experiences with mathematics, and their primary opportunities to experience mathematics as a discipline are seated in the classroom activities in which they engage. (p.525). this study will include the major factors that influence students` perception of instructional tasks.

1.3. OBJECTIVE OF THE STUDY

The following are the objectives of the study:

- To explore the difference in students` perception of instructional tasks assignments with respect to sex, previous mathematics achievement and school.
- To explore the difference in students` achievement in mathematics with respect to sex, previous mathematics achievement and school.
- To explore the relationship between students` perception of instructional task assignments and mathematics achievement.

- To examine the impact of students' perception of individual task, perception of group task, perception of instructional tasks, sex and previous mathematics achievement on mathematics achievement.
- To find out the major factors that may influence instructional task assignments in Addis Ababa city administration in a particular reference to some selected government high schools in Nifas silk-lafto sub city.

1.4. RESEARCH QUESTIONS

- What are the difference in students' perception of instructional tasks assignments with respect to sex, previous mathematics achievement and school?
- What are the difference in students' achievement in mathematics with respect to sex, previous mathematics achievement and school?
- What are the relationship between students' perception of instructional task assignments and mathematics achievement?
- What are the impacts of students' perception of individual task, perception of group task, perception of instructional tasks, sex and previous mathematics achievement on mathematics achievement?
- What are the major factors that may influence instructional task assignments in Addis Ababa city administration in a particular reference to some selected government high schools in Nifas silk-lafto sub city?

Based on the above research questions the following hypotheses were used; where the null hypotheses were:

- H₀₁: *There is no significant difference in students' perception of individual task, group task, instructional tasks and mathematics achievement with respect to sex.*
- H₀₂: *There is no significant difference in students' perception of individual task, group task, instructional tasks and mathematics achievement with respect to previous mathematics achievement.*
- H₀₃: *There is no significant difference in students' perception of individual task, group task, instructional tasks and mathematic achievement with respect to school.*
- H₀₄: *There is no significant difference in students' perception of Individual task and Group task with respect to the total number of students, sex, previous mathematics achievement and school.*

H₀₅: There is no significant relationship between individual task and group task with instructional tasks and mathematics achievement.

H₀₆: There is no significant impact of sex, previous mathematics achievement, individual task, group task and instructional tasks on mathematics achievement.

1.5. SIGNIFICANCE OF THE STUDY

The significances of the study are the following:

- ✓ The study will enable teachers, school management, curriculum developers and other practitioners to gain valuable information about the students' perception of instructional task assignments and mathematics achievement.
- ✓ The study will help teachers to be aware of possible factors that may influence the applications of instructional task assignments.
- ✓ The study will serve as a stepping-stone for further research in the area.

1.6. DELIMITATION OF THE STUDY

To carry out any research work it is necessary to delimit the scope of the study to manageable size. Thus geographically, the study was delimited to Nefas-Slik Laft Sub-city in southern Addis Ababa. There are six government high schools.

Even though the research believes that it would have been better to conduct the study in a wider range, it is difficult to run research work in all the government schools of the sub city due to financial and time constraints. Hence the scope of the study was delimited to three government schools which encompass 50% of the high school in the sub city. These are Ginbot-20 secondary school, Fana-02 secondary school and lafto secondary school. To make the research work more manageable, the study was further delimited to grade 10 mathematics teaching. The reason why the researcher selected N/L/S/C was that the researcher has thought in the majority those staff members will create conducive environment for the researcher to gather data from teachers, students and school principals of respective school.

The subject mathematics was selected because of the interest furthermore; the study was delimited to perception of students in instructional tasks.

1.7 LIMITATION OF THE STUDY

It is difficult to mention all the constraints that were encountered the researcher faced critical of time during the entire period of this research work since he is a full time worker on top of his lack of internet access were unforgettable. In addition some students were not cooperative to complete the questionnaire on time. Despite all these limitations the study was successfully managed and completed.

1.8 DEFINITION OF BASIC TERMS

- **Achievement test:** These measure the present level of performance of individual or groups in academic during (or access) learning process. (ICDR, 1999).
- **Active learning:** is an umbrella term that refers to several models of instruction that focus the responsibility of learning on learners. Bonwell and Eison (1991) popularized this approach to instruction (Bonwell & Eison 1991).
- **Instruction :** refers to any deliberation in the teaching learning process which is intended to promote the learning of students in a formal settings
- **Instructional task assignments:** are student centered activities which has clear learning objectives and leads to an outcome, such as the solution of the problems.
- **Perceptions:** the basis of all learning. Perceptions result when a person gives meaning to external stimuli or sensations. Meanings which are derived from perceptions are influenced by an individual's experience and many other factors. Or it refers to the process of understanding and viewing of instructional task assignments.
- **Survey:** A research tool that includes at least one question which is either open-ended or closed-ended and employs an oral or written method for asking these questions. The goal a survey is to gain specific information about either a specific group or a representative sample of a particular group. Results are typically used to understand the attitudes beliefs or knowledge of a particular group.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

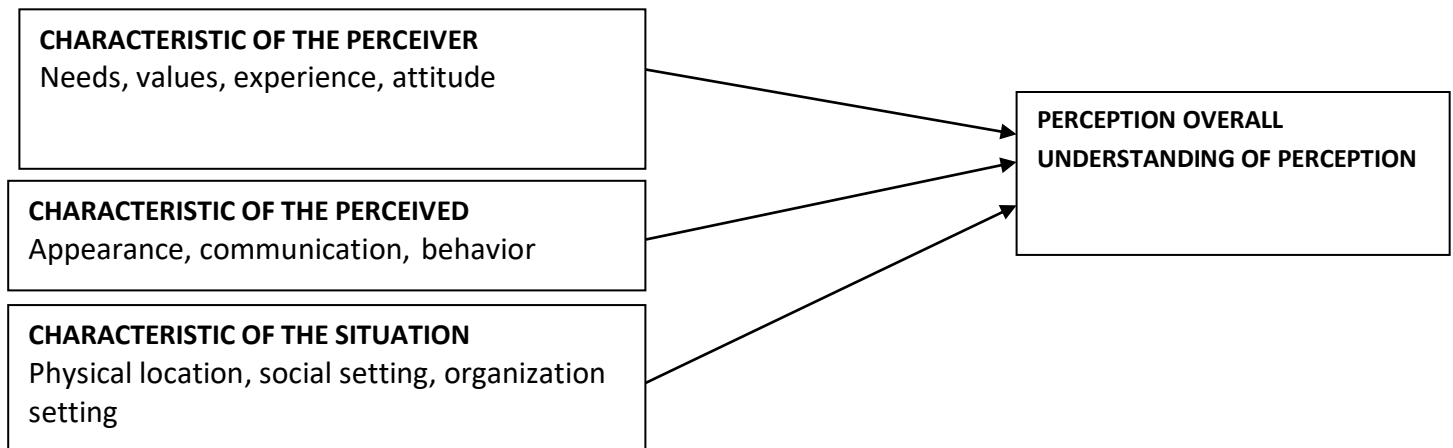
2.1 THE CONCEPT OF PERCEPTION

This study is intended to see students' perception and mathematics achievement. So how students perceive learning in genera and mathematics in particular? As Chandan (1994) explained, perception is the process through which the information from outside environment is selected, received, organized and interpreted to make it meaningful to someone. Therefore, what the students perceived from the environment is seen as their perception. Students take or perceive their environment in an organized frame world that students have built out their own experience and values. Definitely students have their individual need and wants/ however those needs and wants influenced by some other factors. According to Chandan (1994) the three influences on the concept of perception are:

1. The characteristics of the perceiver
2. The characteristic of perceived and
3. The characteristic of the situation

This is illustrated in figure below:

Major influences on the conception process:



Thus, specifically students perceive mathematics in terms of the above characters.

2.2 MAJOR THEORIES LEARNING

Theories of learning are usually the result of long years of study and research by a number of scholars. According to Glasgow and Seels(1998), as cited by Amenu(2005:1) there are three major theories of learning ,namely behaviorism, cognitivism and constructivism which view learning in different perspectives.

Behavioral learning is explained as a result of stimulus response (S-R) associations. Skinner (1983) in Derebissa (2004:62) placed great importance on operant conditioning where an operant is a series of action, which a learner completes. Through reinforcement of learning, said (Skinner), the learning quality becomes greater. Thus, behaviorist places their focus on the task and the stimulus-response model.

Behaviorists view learning as accumulation of responses through selective reinforcement and views teachers as controllers of stimuli (external environment) and shaper of students` behavior through enforcement. While learners view as passive recipient.

Cognitive theorists believe that learning is the result of our attempts to make sense of the world. Cognitive view of learning sees people as active learners who initiate experiences, seek out information to solve problems and recognize what they already know to achieve new insights.

According to cognitive theory of learning students do not merely receive information but actively create a pattern of what it means to learn. That is, students organize, store and retrieve information. It means that students are active meaning makers.

Constructivism predominated education in second half of the 20th century. It is relatively recent development in the history of education.

Basically, the theory is based on observation and scientific study about how people learn. The essence of learning is the shift from passive transfer of information to active problem solving. Scholars like Arends (1997) and Bruner (1996) viewed constructivism as a model of learning that always considers students as an active agent in the process of meaningful learning. Learners are the center of the learning process while teachers help them to construct knowledge rather than to produce a series of facts.

Generally, constructivists' views of learning can be summarized as follows:-

- Learners construct their own learning.
- New learning depends on current understanding.
- Learning is facilitated by social interaction
- Meaningful learning occurs within authentic learning tasks.

2.3 INSTRUCTIONAL METHODS

For the better understanding of the process of learning and the improvement of students, we need to understand the way in which an individual learns. According to Aggarwal (2001) effective teachers use different strategies, tactics or methods depending on their personal talents, the content to be thought, and the interests and abilities of students.

As noted by Aggarwal(2001),a method must link up the teacher and his students into an organic relationships with constant mutual interaction. The main focus of the teaching method is the effective presentation of the subject matter to have the mastery over it. The content and mode of presentation are main elements of teaching method. That means, the subject matter determines the method of teaching to be used.

Teaching methods vary greatly according to what the teacher does, the educational materials that are used, and what the students do. According to ICDR (1999:68) the following are among the common classifications of teaching- learning instructional methods:

- Teacher-centered versus learner-centered methods.
- Direct instruction versus indirect instruction.
- Conventional versus non-conventional method or
- Traditional versus non-traditional method.

These classifications are based on the degree of students' participation in the instructional process.

2.3.1. Teacher - Centered Methods of Instruction

For a long period of time, the teaching -learning process has been, by and large, a process dominated by teacher - centered methods of instruction. The aim of this method of instruction was the preservation of the accumulated stock of knowledge (Aggarwal, 2001:62).

Different research findings indicated that in the teacher - centered method of instruction, teacher is the center of classroom activity. The teacher has been thought to hold most of the knowledge necessary for students to be successful. Osier (1849), in Terefe (2005:1), described the traditional approaches as teacher - centered, or teacher directed and authoritarian or autocratic, because the complete responsibility to determine the work to be done and control of actual classroom procedures are solely that of the teachers. Hence, the teacher - centered approach gives the priority role and responsibility to the teacher. This method considers the teacher as knowledgeable person of subject matter.

Plass (1998:10) explained that basic features of this approach is teacher being owner of the learning, decides on the syllabus, chooses the methods, select the resources, creates experiences and takes and decides when, where, how and even why things are to be done.

Besides, in teacher - centered methods of instruction, the emphasis is on, Plass (1998:3), theory rather than practice and the successful students are the ones who can display their knowledge of the facts that have been fed into them. In other words, they are required to demonstrate their powers of memory and not their skills in processing that knowledge. Learning output is considered more important than the process of arriving at it. Students listen, take notes, digest and then reproduce.

A lesson could be started with introduction or some review of the previous day's work including homework and revision when necessary. A great deal of instruction takes place between teachers and students, by question and answer, usually asked by the teacher.

Many research findings noted that the teacher-centered instructional methods are disadvantageous so as to bring the desired behavioral change in the teaching - learning process. Accordingly, Harris (1980) in Oil (2006:13-14), has listed the major short comings of teacher -centered approach as follows:

- Since this approach has no variety, it is monotonous and boring.
- The learning process depends on the talking of teacher where the learner becomes passive receiver.
- It inhibits active, participation and research ability of the learner and encourages him or her to be submissive.

2.3.2. Learner - Centered Methods of Instruction

In learner-centered approach Knowledge is acquired by learners in the process of their self- initiated inquires and personal style (Janetius and Mulat, 2006:122). According to Plass (1998:3), in contrast to teacher - centered approach, in the learner - centered approach, students are actively involved in the learning process, and their prior knowledge and experience is an integral part of the process. They are encouraged to articulate their ideas and opinions. A variety of approaches is used for different learning styles. No one style of teaching dominates the process. The teacher creates opportunity for learning and encourages learner autonomy. Theory and practice are integrated, and students are assessed not only on their knowledge but also on their understanding of the subject matter. Students work in pairs and in small groups, collaborating, sharing their own and benefiting from each other's individual styles, strategies and skills.

John Dewey (1902), in Bishop (1995:91), argued that instead of fitting the child to the school curriculum, the curriculum should be adapted to the child. A subject has meaning only if it is translated to the child's own experiences and meets his/her growing needs. It goes without saying that what is taught must be interesting and meaningful to the child, as against being interesting only to the teacher.

Continuing his argument, Dewey explained that the interests of children should be used to influence methods of teaching since the children's interest lies more in the sphere of method, rather than content.

As mentioned by Plass (1998:6-7), some of the benefits of a learner - centered methods of instruction are:-

- Students develop skills which are transferable.
- The methodology requires a shift in focus from product to process, the "how" of learning as opposed to the "what" of learning which helps the students to be aware of how to become successful learners, and can apply the resulting knowledge.
- Students learn autonomy and self - direction to take the initiative and to take the risks.
- The students learn to assign and to share responsibilities for tasks,

and peer group pressure ensures accountability on the part of all group members.

- The students are more in control of their learning, they develop the sense of ownership of knowledge, a pride in what they have produced, and they take more responsibility for their own learning and develop independence and autonomy as learners.
- The students create self-esteem, a sense of empowerment, the appetite for challenge and the satisfaction of achievement.

2.3.3 Active learning approach

The active learning approach is one of the learner-centered methods. It is an approach that gives due emphasis to the learner to be an actor in learning and searching solutions rather than to be dependent only on the teacher (Silberman, 1996). Children are active by their nature and any process or method that is not based on upon the student activity is not in accord with the progressive educational theories. Rousseau considers the child as a “hero” in the drama of education and as such he must be allowed to play the dominant role.

2.3.4 Instructional tasks assignments

Instructional task assignments are student centered activities which has clear learning objectives and leads to an outcome, such as the solution of the problems.

Until recently, the topic of oral and written communication in mathematics has not been a popular topic for research. The basic difference between the two forms of communication is that oral communication is done in **collaboration with others or it is group task**, while written communication is typically an **individual task**. O’Shea (2004) conducted a study at NUI-Maynooth in Ireland where he introduced writing into the mathematics department because he believed that “students should be able to communicate mathematics both verbally and in written form” (p. 101).

These two forms of communication are particularly important because they are the two most common types of communication. His study focuses on first and second year mathematics courses and suggests that students do not like to communicate in math

because it is difficult. The difficulty in communicating mathematics is largely due to the fact that students are never formally taught the “language of mathematics” (p. 101). Finally, O’Shea believes that once educators see value in written communication in mathematics, then students will be able to see the importance as well. Some of the basic instructional tasks are discussed below.

2.3.4.1 Individual Task

The teacher's notes often suggest that students spend some time working on a question individually before working with their partner or group. Asking students to first think about and try a question on their own gives them time to sort out their own ideas and assess what makes sense to them and what causes them difficulty. For an occasional question it is suggested that students work entirely their own. Such questions may be less demanding than questions for which group work is suggested, or they may provide an opportunity for teachers to assess each student's understanding or skill at an important stage in the development of key mathematical ideas in the unit.

According to *Connected Mathematics* program (CMP) exercises at the end of an Investigation are intended to be solved individually, outside of class. These exercises give students a chance to practice and make sense of ideas developed in class. These exercises are narrower in scope and demand than are the Problems in the Investigations.

Self-regulated learning

As we understand from the name self regulated learning it is typically an individual task. Self-regulation is defined by social cognitive researchers as proactively initiated thoughts, feelings, and behaviors that are planned and cyclically adapted based on self-generated or performance feedback in order to attain personal goals (Zimmerman, 1989, 2000). It is a cyclical process in that feedback from prior task performance is used to evaluate and adjust one's methods of learning to optimize academic outcomes. This cyclical feedback loop consists of three sequential phases: forethought (i.e., processes that precede efforts to learn or perform), performance control (i.e., processes occurring during learning efforts), and self-reflection (i.e., processes occurring after learning or performance; Zimmerman, 2000).

Embedded within each of these three phases are several inter-related sub-processes. For example, forethought involves processes that both guide and motivate learning such as goal setting, strategic planning, and adaptive self-motivation beliefs such as high levels of task interest and perceived instrumentality. These forethought processes initiate a proactive, mindful approach to learning and influence students' behaviors during the performance control phase, such as implementing task-specific learning strategies, attention, and monitoring one's learning. Ultimately, the information that an individual gathers during the performance control phase is used by an individual to engage in self-reflection, including evaluating goal progress, identifying causes of the successes and failures, and deciding upon more adaptive courses of actions if one's goals were not attained.

According to (Gettinger & Seibert, 2002; Weinstein, Husman, & Dierking, 2000) as seen by Timothy J. (2009) to optimize the effectiveness of these regulatory processes, students will often enlist the use of various self-regulation strategies (i.e., tactics or sequences of activities), such as making a study schedule, developing self-tests to assess learning progress, or recording the types of information that one cannot easily recite from memory during studying. Self-regulation strategies facilitate students' planning and goal-setting prior to learning (forethought), enhance their attention-focusing and self-monitoring processes during learning or task performance (performance control), and enable them to evaluate the effectiveness of their learning methods after task performance (self-reflection).

2.3.4.2 Group task

Working collaboratively or doing in group allows students to tackle more complicated and more conceptually difficult problems. Carefully managed, collaborative learning can be a powerful tool for teachers to use during classroom instruction. When the teacher assigns group tasks, the students may try to solve the problem with their partner, with in a small-group or by discussing as a whole class.

Pairs and Small-Group Work

Connected Mathematics suggests two types of collaborative-learning groupings: partner work and small-group work. In both work the teacher's guide often suggested that students work on the exploration of a problem collaboratively. Group work supports the generation of a variety of ideas and strategies to be discussed and considered, and it enhances the perseverance of students in tackling more complicated multi-step and multi-part problems. It is appropriate to ask students to think about a problem individually before moving into groups, allowing them to formulate their own ideas and questions to bring to the group. These multiple perspectives often lead to interesting and diverse strategies for solving a problem. Group work is also suggested for some of the Unit Projects. These projects tend to be large, complicated tasks. Working in a group allows students to consider a variety of ideas and helps them complete the task in a reasonable amount of time.

Whole class discussion

Research suggests that whole-class discussion can be effective when it is used for sharing and explaining the variety of solutions by which individual students have solved problems. It allows students to see the many ways of examining a situation and the variety of appropriate and acceptable solutions. Wood (1999) found that whole-class discussion works best when discussion expectations are clearly understood. Students should be expected to evaluate each other's ideas and reasoning in ways that are not critical of the sharer. This helps to create an environment in which students feel comfortable sharing ideas and discussing each other's methods and reasoning. Furthermore, students should be expected to be active listeners who participate in the discussion and feel a sense of responsibility for each other understands.

Cognitive research suggests that conceptual change and progression of thought result from the mental processes involved in the resolution of conflict and contradiction. Thus, confusion and conflict during whole-class discussion have considerable potential for increasing student learning when carefully managed by the teacher. As students address challenges to their methods, they strengthen their understanding of concepts and procedures by working together to resolve differences in thinking or confusions in

reasoning. In a sense, the discussion becomes a collaborative problem-solving effort. Each individual then is contributing to the total outcome of the problem-solving situation. This discussion helps produce the notion of commonly held knowledge (public knowledge).

Whole-class discussion follow students work on problem-solving activities. The discussion should be a summary of individual work in which key ideas are brought to the surface. This can be accomplished through students presenting and discussing their individual solution, methods or through other methods of achieving closure that are led by the teacher, the students, or both.

Whole-class discussion can be an effective and useful instructional practice. Some of the instructional opportunities offered in whole-class discussion do not occur in small group or individual settings. Thus, whole-class discussion has an important place in the classroom together with other instructional practices.

Guidelines for working in Groups

According to connected mathematics program (CMP), there are various methods teachers can use to establish groups, such as assigning students to a group for a whole unit of study or randomly drawing for group assignments on a more frequent basis. You might also want to arrange the seating in the room to minimize movement during the transition from individual to group to whole-class settings.

Below is a suggested set of Student Guidelines for Group Work which is adapted from connected mathematics program:

- Move into your groups quickly and get right to work.
- Read the instructions aloud or recap what the teacher has challenged you to find out. Be sure every group member knows what the challenge is.
- Part of group work is learning to listen to each other. Don't interrupt your classmates. Make sure each person's ideas are heard and that the group answers each person's questions.
- If you are confused, ask your group to explain. If no one in the group can answer the question, and it is an important question, raise your hand for the teacher.
- If someone in your group uses a word or an idea you do not understand, ask for an explanation. You are responsible for learning all you can from your group. You

are also responsible for contributing to the work of your group. Your attempts to explain to others will help you to understand even better.

- Give everyone in the group a chance to talk about his or her ideas. Talking out loud about your thinking will help you learn to express your arguments and clarify your ideas.
- If your group gets stuck, go over what the problem is asking and what you know so far. If this does not give you a new idea, raise your hand for the teacher.
- Be prepared to share your group's ideas, solutions, and strategies and to explain why you think you are correct. Make sure you look back at the original problem and check that your solutions make sense.
- You are responsible for recording your group's ideas and solutions in your notes.

When students work in groups, there is always a possibility that some students will dominate, while others will not participate.

Making sure the size of the group is appropriate for the size of the task can help ensure that all students play a role. You can also facilitate participation by requiring that each group member be given the opportunity to share his or her thoughts and ideas before the group discussion begins. It is also helpful to give students some time to think about or work on the Problem individually before discussing it with their groups.

The classroom conversation that occurs during the Summarize phase provides an important opportunity to push students' mathematical thinking. By examining and testing ideas, students can learn mathematical skills and strategies and make connections and generalizations. According to connected mathematics program teachers might use the following suggestions to increase interaction and participation.

- Encourage students to respond to other groups or student's presentation, conjectures, strategies, or questions.
- Have students summarize the essence of a group's or student's presentation.
- After a group or student presents, have others in the class ask questions to challenge the groups or student's thinking.

- Ask a student to create and post an incorrect solution to stimulate the thinking of the class and generate a conversation.
- If you have a student who struggles, find opportunities for him or her to present when you know he or she has a correct answer.
- If there is repetition among strategies, have students discuss the similarities or contribute new thoughts, rather than just repeat ideas.
- Encourage students to look for common ideas in their strategies and representations.

Advantages of Group Activities

Moving on to the advantages of whole-class activities, a vital aspect of whole-class discussion is the bonding together of the whole group. Moreover, the larger the group, more variety there is in the thoughts, opinions and experiences which can contribute to the learning process.

Whole class discussion commonly encourages fluency and a meaningful exchange of thoughts among the participants. It also ensures teacher's access to all students. It particularly works well when it is used to clarify new thoughts and concepts. It can also be used to play some motivating and lively games. In such games the students are required to sit together and play various language development games which are full of fun. Furthermore, it is thought of as a time well-organized strategy.

Whole class activity is also usually used at the end of any lesson to summarize what has been taught or done in that particular lesson. It is especially useful and time well-organized when it is used in question answers sessions to evaluate students understanding of a topic. Hilary Cooper (1993) suggested that students learn more from whole class teaching which involves explanations and questioning techniques.

Group activities, on the other hand, increase student involvement in class activities. Students in groups talk and communicate more readily with each other. They learn how to correspond and share thoughts. Secondly, group activities encourage students to learn through discussions. Students, initially, weigh the pros and cons of a given situation with each other and then try to find a logical solution to the problem. Thirdly, group activities, encourage students to work in collaboration with one another. With practice, group

members realize that until and unless all place in their best, they would not be able to complete the given task proficiently. Eventually, they learn to accept and value each others' contribution. From my experience as a secondary teacher, I have observed that such kinds of group activities make sure most participation from all group members.

Another suggested situation in which group seating arrangement can be useful is, sharing of resources. When resources have to be mutual, group arrangement allows 3-5 children to straightforwardly reach and use one centrally placed set of resources, such as pens, glue, paints etc.

Similarly, if the objective of a lesson is reinforcement of lessons taught earlier, than the teachers should arrange the students in tiny ability groups. This would enable the teacher to help those students who need reinforcement while the rest could do an extension activity to further their understanding of the concept.

Depending on the nature of the task, in a primary classroom, if a teacher wants to work as well as go within tiny groups of students, then group seating should be plotted. As per Nigel Hastings, there is consistency between what the teacher is tiresome to do, what the pupils are probable to do, the kind of interaction that is intended and the configuration of the furniture. Thus, group seating seems to be a useful way to organize secondary classrooms.

Another benefit of group work is that it enables students, who are learning English as a second language, to mend their listening and speaking skills. Many teachers of English language are of the opinion that the primary benefit of group work is that it provides practice in speaking and listening.

Some of the instructional tasks may be grouped under individual task or group task depending on the nature of the question assigned by teachers. Other instructional task like home work, project work, laboratory work etc used for both individual task and group task depending on the nature of the task assigned.

Home work

Cooper, Robinson and Patall (2006) from Duke University, have put together a synthesis report summarizing the findings of research about homework from 1987 to 2003.

One of the areas that they focus on is the struggle over homework between home and school, and this has become a hot topic with the media where many differing opinions exist. Cooper states that many students do not like doing homework and many teachers struggle to get students to complete homework.

Parents are often times caught in the middle of this ongoing battle between students, who feel that homework is often a punishment, and teachers, who want students to practice concepts taught in the classroom. Again, Cooper states that there is clearly not a simple solution to the problem or it would be solved already. However, any understanding and insight that can be brought to the situation may help to alleviate tensions between parents and teachers allowing them to work together for the good of the students.

Xu (2005) conducted a study that discusses the purposes for doing homework from three perspectives, the students, the teachers and the parents. Interestingly, Xu states there is not a lot of research about students' perceptions of homework. Xu collected information about the perceptions of homework from 920 students in grades 5 – 12. He discovered ten purposes for doing homework with the main one being the practice of concepts taught in the classroom with the expectation of increased student achievement. All ten of the purposes can be divided into two groups, intrinsic reasons and extrinsic reasons. The main intrinsic reason that students do homework is to better themselves, while the most common extrinsic reason for completing homework is to please the teacher or parents. Xu found that the students who only did homework for intrinsic reasons had a lower rate of incomplete homework.

Additionally, Trautwein (2007) conducted three studies including 26,972 seventh through tenth grade German students where he looked at the factors that contributed to student achievement. These factors are differentiating homework time, homework frequency and homework effort. He “tested the popular claim that homework time is positively related to achievement and achievement gains” (p. 385). The fact that time spent doing homework helps students to score better academically is a very popular assumption that is believed by teachers and parents alike. However, his results indicated that the time

students spend on homework is not necessarily what increases student achievement, but rather increased effort on homework and more frequent assignments does increase achievement.

The general knowledge that homework increases student achievement is wonderful, but this does not change the fact that teachers still have to come up with ways to get students to actually complete their homework. Bryan and Sullivan-Burstein (1998) conducted a study assessing homework completion with 11 elementary teachers and 123 students where they found significant increases in homework completion based on three different strategies. These strategies included giving assignments that pertained to real-life situations, using homework agendas and graphing homework completion. The classroom conversation that occurs during the Summarize phase provides an important opportunity to push students' mathematical thinking. By examining and testing ideas, students can learn mathematical skills and strategies and make connections and generalizations.

Project work

Vithal (2004) found projects or project work to form a “progressive” approach to mathematics education and advocates more “open-ended”, “problem-centered” activities in which learners are given greater independence in their learning, in contexts relevant to them. In terms of the outcomes based approach to learning, project work is extensively used as an assessment strategy in modern South African Schools.

Not much research exists to test the effect and use of project work. In countries like Scandinavia and Denmark project work had been introduced for decades. Wurnig (2004) as cited by Vithal (2004) found significant changes in the learning process when using project work in mathematics problem solving. Some of these were: (i) the learning process is more students oriented; (ii) the lecturer is not the only source of knowledge; (iii) There are more mathematical discussions among students; (iv) the computer is an additional expert in the learning situation; (v) there is an emphasis on problem solving and application oriented mathematics. Using technology like Mathematics, students can explore and model mathematics.

Laboratory work

Laboratory has been described as a room or a building specially built for teaching by demonstration of theoretical phenomenon into practical terms. With the laboratory experience, students will be able to translate what they have read in their texts to practical realities, thereby enhancing their understanding of the learnt concepts. Farombi (1998) argued the saying that seeing is believing is the effect of using laboratories in the teaching and learning of science and other science related disciplines as students tend to understand and recall what they see more than what they hear. Laboratory is very important and essential to the teaching of science and success of any science course is much dependent on the laboratory provision made for it. Lending credence to this statement, Ogunniyi (1982) said that there is a general consensus among science educators that laboratory occupies a central position in science instruction. It could be conceptualized as a place, where theoretical work is practicalized and practical's in any learning experiences involve students in activities such as observing, counting, measuring, experimenting, recording and carrying out consensus among science educators that laboratory occupies a central position in science instruction. It could be conceptualized as a place, where theoretical work is practicalized and practical's in any learning experiences involve students in activities such as observing, counting, measuring, experimenting, recording and carrying out fieldwork. These activities could not be easily carried out, where the laboratory is not well equipped. There is usually a strong move to emphasize the dependence of mathematics teaching on the existence of a well-equipped mathematics laboratory. In this study, Bajah (1980) found that the correlation between the laboratory adequacy and Chemistry achievement is significant. Ango and Silo (1986) asserted that laboratory work among others:

- Stimulate learners interests as they are made to personally engage in useful scientific activities and experimentation
- Affords the learner the basic skills and scientific method of solving problems
- Promotes long term memory of the knowledge obtained

The Mathematics laboratory should be the focal points of all mathematics work in the school. It should be the calculating center of the school. The truth of abstractions is demonstrated in a concrete manner and the students, who are slow to comprehend

abstractions, appreciate them more readily and become interested in mathematics. The mathematics laboratory is a specially equipped room in a building, where mathematics lessons or activities hold on a regular basis or a corner of the regular classroom with tables and apparatus or a room containing a collection of teaching aids for students' manipulation (Odili, 1990). It is also a remedial environment, where advantaged or disadvantaged, the poorest or the best gifted students may have active sensory experiences from which concepts emerge. It is a resource centre for the learning of mathematics. It is based on the principle of doing, learning by observation by proceeding from concrete to abstract. Some of the advantages of having a mathematics laboratory according to Ezike and Obodo (1991) include:

- It makes mathematics learning very interesting, meaningful and exciting
- It is a means of verifying a mathematical principle, law or theory
- It can be used to illustrate basic principles, laws or rules and development of such principles, laws or rules
- It is a means of practicing one or more of the cognitive and psychomotor skills like the ability to construct, measure, arrange, observe, classify and interpret data
- It provides opportunity for students to learn how to use cutters, turners, drill bits, mathematical set, paint, brush, models of solids and charts and other kinds of laboratory equipment in mathematics
- It encourages mathematical exploration and manipulation by students and keeps them alive and thinking, which also helps them to realize the applications of mathematics

When students are exposed to practical or practical activities, they are stimulated and after, develop confidence and ability in problem solving (Onwu and Moneme, 1986).

Adequate laboratory helps to provide a forum wherein the learner is given the exercise to subject his beliefs, idea, statements and theoretical proposition to tests. In the absence of adequate resources and equipment for practical activities, practical's can rarely be experienced by students at any level or frequency in the learning of science in general and Mathematics in particular.

No matter how excellent and attractive a teaching learning approach is, it only becomes relevant and important if practical activities are built into the daily teaching learning experience of students. To maintain and arouse the interest of students in this perspective, the teacher should be effectively involved in order to transform knowledge and facts to the learner for a good performance in any examinations.

To what extent has laboratory been able to achieve these objectives? Odulaja and Ogunwemimo (1989) said that the teacher assumes a position of dispenser of knowledge with the laboratory serving the function of drill or verification. They further explained that at the other extreme, the teacher assumes the position of guide to learning and laboratory as a place, where knowledge is discovered. However, there are growing evidences that teachers do not exhibit behaviors, which are complementary to achieving the stated objectives. These objectives include improving on:

- Method of teaching practical work
- Inadequacy or absence of well-equipped laboratories
- High enrolment of students
- Inadequacy of resources for teaching and learning practical work
- Quality and quantity of teachers

2.4 Research-based Top Ten Strategies for Mathematics Achievement

Research findings indicate that certain teaching strategies and methods are worth careful consideration as teachers strive to improve their mathematics teaching practices. The following ten instructional practices are from "Improving Student Achievement in Mathematics. Research findings adapted from Douglas A. Grouws & Kristin J. Cebulla; December 2000 (Updated January 2002). Published by ERIC.

1. Opportunity to Learn
2. Focus on Meaning
3. Problem Solving
4. Opportunities for Invention and Practice
5. Openness to Student Solutions and Student Interactions
6. Small Group Learning

7. Whole-Class Discussion
8. Focus on Number Sense
9. Use Concrete Materials
10. Use Calculators

1. Opportunity to Learn

The extent of the students' opportunity to learn mathematics content bears directly and decisively on student mathematics achievement. Opportunity to learn (OTL) was studied in the First International Mathematics Study (Husén, 1967), where teachers were asked to rate the extent of student exposure to particular mathematical concepts and skills. Strong correlations were found between OTL scores and mean student achievement scores, with high OTL scores associated with high achievement. The link was also found in subsequent international studies, such as the Second International Mathematics Study (McKnight et al., 1987) and the Third International Mathematics and Science study (TIMSS) (Schmidt, McKnight, & Raizen, 1997).

It is important to note that opportunity to learn is related to equity issues. Some educational practices differentially affect particular groups of students' opportunity to learn. For example, a recent American Association of University of Women study (1998) showed that boys' and girls' use of technology is markedly different. Girls take fewer computer science and computer design courses than do boys. Furthermore, boys often use computers to program and solve problems, whereas girls tend to use the computer primarily as a word processor. As technology is used in the mathematics classroom, teachers must assign tasks and responsibilities to students in such a way that both boys and girls have active learning experiences with the technological tools employed.

2. Focus on Meaning

There is a long history of research, going back to the work of Brownell (1945, 1947), on the effects of teaching for meaning and understanding. Investigations have consistently shown that an emphasis on teaching for meaning has positive effects on student learning, including better initial learning, greater retention and an increased likelihood that the ideas will be used in new situations.

3. Problem Solving

Students can learn both concepts and skills by solving problems. Research suggests that students who develop conceptual understanding early perform best on procedural knowledge later. Students with good conceptual understanding are able to perform successfully on near-transfer tasks and to develop procedures and skills they have not been taught. Students with low levels of conceptual understanding need more practice in order to acquire procedural knowledge.

4. Opportunities for Invention and Practice

Giving students both an opportunity to discover and invent new knowledge and an opportunity to practice what they have learned improves student achievement.

Data from the TIMSS video study show that over 90% of mathematics class time in the United States 8th-grade classrooms is spent practicing routine procedures, with the remaining time generally spent applying procedures in new situations. Virtually no time is spent inventing new procedures and analyzing unfamiliar situations. In contrast, students at the same grade level in typical Japanese classrooms spend approximately 40% of instructional time practicing routine procedures, 15% applying procedures in new situations, and 45% inventing new procedures and analyzing new situations. Research suggests that students need opportunities for both practice and invention. Findings from a number of studies show that when students discover mathematical ideas and invent mathematical procedures, they have a stronger conceptual understanding of connections between mathematical ideas.

5. Openness to Student Solutions and Student Interactions

Teaching that incorporates students' intuitive solution methods can increase student learning, especially when combined with opportunities for student interaction and discussion. Student achievement and understanding are significantly improved when teachers are aware of how students construct knowledge, are familiar with the intuitive solution methods that students use when they solve problems, and utilize this knowledge when planning and conducting instruction in mathematics. Structuring instruction around carefully chosen problems, allowing students to interact when solving problems, and then providing opportunities for them to share their solution methods result in increased

achievement on problem-solving measures. These gains come without a loss of achievement in the skills and concepts measured on standardized achievement tests.

6. Small Group Learning

Using small groups of students to work on activities, problems and assignments can increase student mathematics achievement. Davidson (1985) reviewed studies that compared student achievement in small group settings with traditional whole-class instruction. In more than 40% of these studies, students in the classes using small group approaches significantly outscored control students on measures of student performance. In only two of the 79 studies did control-group students perform better than the small group students, and in these studies there were some design irregularities. From a review of 99 studies of cooperative group-learning methods, Slavin (1990) concluded that cooperative methods were effective in improving student achievement. The most effective methods emphasized both group goals and individual accountability.

7. Whole-Class Discussion

Whole-class discussion following individual and group work improves student achievement. Research suggests that whole class discussion can be effective when it is used for sharing and explaining the variety of solutions by which individual students have solved problems. It allows students to see the many ways of examining a situation and the variety of appropriate and acceptable solutions. Wood (1999) found that whole-class discussion works best when discussion expectations are clearly understood. Students should be expected to evaluate each other's ideas and reasoning in ways that are not critical of the sharer. Students should be expected to be active listeners who participate in discussion and feel a sense of responsibility for each other understands.

8. Focus on Number Sense

Teaching mathematics with a focus on number sense encourages students to become problem solvers in a wide variety of situations and to view mathematics as a discipline in which thinking is important. Number sense relates to having an intuitive feel for number size and combinations, and the ability to work flexibly with numbers in problem situations in order to make sound decisions and reasonable judgments. It involves

mentally computing, estimating, sensing number magnitudes, moving between representation systems for numbers, and judging the reasonableness of numerical results. Markovits and Sowder (1994) studied 7th-grade classes where special units on number magnitude, mental computation and computational estimation were taught. They determined that after this special instruction, students were more likely to use strategies that reflected sound number sense, and that this was a long-lasting change. In a study of second graders, Cobb (1991) and his colleagues found that students' number sense was improved by a problem-centered curriculum that emphasized student interaction and self-generated solution methods. Almost every student developed a variety of strategies to solve a wide range of problems. Students also demonstrated increased persistence in solving problems.

9. Use Concrete Materials

Long-term use of concrete materials is positively related to increases in student mathematics achievement and improved attitudes towards mathematics. In a review of activity-based learning in mathematics in kindergarten through grade 8, Suydam and Higgins (1977) concluded that using manipulative materials produces greater achievement gains than not using them. In a more recent meta-analysis of sixty studies (kindergarten through postsecondary) that compared the effects of using concrete materials with the effects of more abstract instruction, Sowell (1989) found that the long-term use of concrete materials by teachers knowledgeable in their use improved student achievement and attitudes.

10. Use Calculators

Using calculators in the learning of mathematics can result in increased achievement and improved student attitudes.

Studies have consistently shown that thoughtful use of calculators improves student mathematics achievement and attitudes toward mathematics. From a meta-analysis of 79 non-graphing calculator studies, Hembree and Dessart (1986) concluded that use of hand-held calculators improved student learning.

Analysis also showed that students using calculators tended to have better attitudes towards mathematics and better self-concepts in mathematics than their counterparts who

did not use calculators. They also found that there was no loss in student ability to perform paper-and-pencil computational skills when calculators were used as part of mathematics instruction. Research on the use of graphing calculators has also shown positive effects on student achievement. Most studies have found positive effects on students' graphing ability, conceptual understanding of graphs and their ability to relate graphical representations to other representations.

Most studies of graphing calculators have found no negative effect on basic skills, factual knowledge, or computational skills.

2.5 Instructional task in Active learning

Instructional strategies are instructional activities which are used to facilitate active learning and to implement the essential features of active learning approach by involving students in doing things and thinking about what they are doing (Cole, 1994). The use of these techniques in the classroom is vital because of their powerful impact upon students' learning.

According to Silberman (1996) some of the instructional strategies (active learning methods) are inquiry method, discovery method, project method, problem - solving, Discussion, Brain storming, Debating, Role-Playing, Group work, Demonstration, Balloon game, Storytelling, Field trip, Drama, Pyramiding, Jigsaw groups, Gapped lecture, etc.

On the other hand, instructional tasks may include all those activities which teachers assign students as a part of their instructional activities in order to attain instructional objectives. Some of these tasks can be group/individual works in general and home works, class works, project works, laboratory work, reading assignments, etc. Brophy and Alleman (1991) in Cole (1994:256) defined learning activities as "anything that students are expected to do, beyond getting in put through reading or listening, in order to learn, practice, apply, evaluate, or in any other way respond to curricular content". In the same way Plass (1998:3) defined task as a learner activity which has clear learning objectives and leads to an outcome such as the solution to a problem. Supporting this idea, Derebssa (2004:219) explained that tasks represent samples of the students' activities that students may be asked or assigned to do to support the program goals and objectives.

Activities need not be an exhaustive list, but rather, represent quality examples of the types of activities /tasks that would support the specified objectives. Thus, from the above definitions, it is possible to deduce those instructional tasks are active learning strategies that stimulate student's interest and enhance learning.

There are many important criteria for the effectiveness of learning activities and work tasks in promoting student learning. As explained by Cole (1994:259-260) and Aggarwal (2001:99) some of these variables are listed as follows:

- . Activities and work tasks must be useful, effective and efficient means of accomplishing worthwhile curricular goals. That means, task assignments are relevant if they are related to prescribe instructional tasks.
- . The difficulty level of a task should match with the maturity level and ability of the students to complete the task.
- . The task assignments should arouse the motivational value of the students so that the students can perform well on the task.
- . The meaningfulness of the work tasks for students' back grounded needs are more likely to result in better task performance.
- . The assignments should be varied and adaptable to the needs and interests of the students.
- . Systematic organization of learning activities and work tasks facilitates student success and accomplishment of intended out comes.

Generally, when assigning work tasks, teachers should select those tasks that are likely to benefit students and enhance learning. As noted by Cole (1994:275-279) the following are some of the principles of assigning appropriate work tasks in order to promote student learning.

- ✓ Ensure that students are assigned work tasks that involve them in practical activities in order to achieve instructional goals.
- ✓ Make sure that all work tasks are meaningful and related to instructional objectives.
- ✓ Work tasks are meaningless to students unless they match their knowledge, understanding and experience and are relevant to instructional objectives. .
- ✓ Avoid tasks that involve meaningless or rote practice. That means, tasks should

involve meaningful practice or active, problem-solving abilities so as to achieve understanding of new concepts and acquisition of skills.

- ✓ Ensure that the content and format of work tasks are inherently interesting so that the students will become actively involved in the assigned tasks.
- ✓ Make sure that each work task includes both new content and prior experience in order to integrate new knowledge with previously acquired knowledge that results in successful and better performance in the assigned tasks.
- ✓ Set work tasks that allows students to generalize or transfer their knowledge to practical problems and real - life situations.
- ✓ Vary the format and content of work tasks. Students can be maintained if there are sufficient variations in the tasks they are required to compete.
- ✓ Set the work tasks in accordance with the level of understanding of the students.
That means, set easy tasks for those student with learning difficulty and challenging work tasks for above average ability students.
- ✓ Make appropriate changes if students experience difficulty with any particular aspect of a work task.
- ✓ Sequence task items in the order from easy to difficult.
- ✓ Schedule work tasks appropriately since the effectiveness of work tasks can be influenced by the way they are scheduled.

From the above discussion, one can understand that the effectiveness of instructional task highly depends on the way the work tasks are designed to motivate the students to actively participate in completing the task assignments. Thus, teachers should consider different variables that may influence the effectiveness of task assignments while constructing the tasks for their students. In addition to this, students should be prepared adequately to accomplish the instructional task assignments that lead to student learning.

2.6 FACTORS INFLUENCING STUDENTS' PERCEPTION OF INSTRUCTIONAL TASKS

A number of factors may facilitate or hinder the students' perception of instructional tasks in educational system. However, in this part of review of literature, the researcher only stresses on teacher-related, student-related and school-related factors that may

influence the implementation of active learning approach in general and students' perception of instructional tasks in particular.

2.6.1. Teacher-Related Factors

Good and effective education in the classroom demands a well - prepared teacher, a competent teacher (both academically and professionally) and on the selection of best teaching strategies, activities and materials to achieve the objectives, which in turn depends on the quality of teacher' s training institutes.

To maximize the development of changes in education, teacher education next to curriculum has special significance (smith, 1987 in oli (2006)).

Bruner (1996) mentioned about the general areas of the teachers' competence related to components of theoretical knowledge, about learning and human behavior, mastery that required practical application in concrete situation, auricular arrangement, and knowledge of general and specific methods of teaching. This is because theoretical knowledge can be used to interpret situation and solve- problems, many classroom events that may be recognized, reserved by applying theories and concepts of human behavior. He stresses that the quality of teaching has direct relation with the teacher's extensive training and repeated exercises.

The way teachers trained can strongly affect the whole educational process, particularly the implementation of active learning approach, since teachers are the most important elements in implementing active learning. For this purpose and to reflect the essence of their profession, teachers should be properly trained. 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 behavior (World Bank, 1997:148) as cited by Bedel (2008:56).

To strengthen the new method of instruction the Ministry of Education has clearly identified the learner-centered method in general objectives of teacher' s education in Ethiopia, which include:-

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

using a curriculum where content and methods are integrated.

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

Hence, if teachers are trained in accordance with the general objectives of teacher education set by Ministry of Education, the active learning approach can be implemented as intended. In addition to pre - service training, in - service training plays a great role in improving and facilitating teaching - learning process. Attitudinal and behavioral changes, as well as, acquaintance of new skills and strategies are the result of in - service trainings. Researchers indicate that the attitude of teachers is also a very important factor that has to be considered in implementing active learning approach.

Due to their perception many teachers tend to stick to teacher - centered method rather than learner centered method. As noted by, Branda and Ginnis (1986) as cited in Sirak (2000), teachers fear that their power, reputation, and position will collapse if teaching and learning functions which were possessed by a teacher are shifted to students and the group. In the face of the society, a teacher is a knowledgeable person who is more appreciated and valued than facilitator and resourceful person.

2.6.2. Student-Related Factors

Active learning methods encourage students' autonomous learning and problem-solving skills. It provides pupils with greater personal satisfaction, more interaction with peers, promotion of shared activity and teamwork, greater opportunities to work with a range of pupils, and for all members of the class, to contribute and respond (Capel, et al, 1995) in Lemma (2006).

In active learning situation, teachers may give students group works and individual tasks, which require application of a concept that may not be done with rote memorizing. Such context, may force students to exert more efforts on what they are doing. As a result, students may view active learning as something threatening. Such thinking may make students to lack confidence and be filled with anxiety (Farrant, 1980). That means, lack of confidence or intellectual maturity may prevent students from accepting responsibilities for own learning.

According to Escandon (2004:6-8) student resistance is manifested behavior or practices, such as:

- Sitting in the back of the classroom.
- Repeated absence.
- Lack of responsibility.
- Pretending not to know.
- Negligence to all class activities.
- Not responding to questions.
- Forgetting materials (pens, textbooks, notebooks).
- Forgetting assignment deadlines and evaluation days.
- Indifferences (Sleeping in class, daydreaming, not taking notes, not completing assignments, plagiarism).
- Repeatedly failing examinations.
- Negative attitude towards constructivist approaches to learning.
- Rudeness (excessive lateness, making noise, chattering, operating mobile telephones, ignoring simple requests, frequent exits from class, ignoring requests to be quiet).

Furthermore, Escandon stressed that these students' disruptive behavior are a sign of generalized dissatisfaction with the education system.

As Cole (1994:304) explained, there are three major categories of factors that are causes of inappropriate behavior:

- The first category includes classroom and teacher - related variables (e.g. Poor instruction, poor classroom communication and organization).
- The second categories are the home and social group variables (e.g. unfavorable home background, lack of social support from the family).
- The third category refers to student's adjustment and personality variables (emotional disorders, distractibility).

Generally, in spite of all contributions of active learning approach to learning, the students may not have appropriate perception towards the approach.

They have developed negative attitude due to various reasons and their resistance could be manifested in different ways as discussed above.

However, since the role of the students is very important in implementing active learning approach, it is necessary to encourage and develop interest in students in order to make practical the approach.

2.6.3. school-related factors

The support of school management is very important in implement active learning approach. The school principals are expected to provide feedback, monitoring, guiding, redirecting and giving professional assistance for the purpose of solving problems and improving the teaching-learning environment and the process in order that the desired goals would be achieved.

Besides, social environment of a given educational institution, the location, size, shape and construction of classroom, as the presence of school facilities like, furniture, resources centers, laboratory services have direct bearing in the instructional methods. The nature of classroom is one of the most important factors that should be considered in the teaching - learning process. According to Silberman (1996:6), the physical environment in a classroom can make or break active learning. The interior of classrooms can challenge active learning especially when the furniture is less than ideal. Classrooms are adequate when there is desk for every pupil and when it is well ventilated with good light and there is a standard chalk board for every class.

As Amare (1998:294) explains, over crowdedness of classroom is one of the highly observed critical problems of education in Ethiopian context. This problem has hindered student follow up, student participation, teacher - student communication and feedback in the classroom. Thus, giving students enough attention and meeting the need of every student, so as to engage actively in the learning process is difficult in large class size.

For this reason, teachers attempt to retain control and teach all the students at the same time by lecturing them. What can be said here is that, for proper implementation of active learning the number of students in a class should be ideal.

On the other hand, availability and effective utilization of resource centers managed by skilled personnel, the presence of well organized and managed library which is stacked

with latest, varied and sufficient reading room, with appropriate seating facilities, and the presence of trained person in laboratory science and the presence of laboratories equipped with modern laboratory materials which managed by qualified of active learning approach (Farrant, 1980). Generally, the physical environment and of schools, such as classroom arrangement, class size, furniture arrangement, classroom appearance and layout and classroom facilities contribute a lot to promote active learning approach.

CHAPTER THREE

RESEARCH DESIGN AND METHEDOLOG

As mentioned earlier, the purpose of this study is to assess students` perception of instructional task and mathematics achievement in grade 10 of some selected government secondary schools in Nefas Silk-lafto sub city, Addis Ababa. For this purpose, **survey** method with qualitative and quantitative approach was employed to disclose the students` perception of instructional tasks and mathematics achievement in the selected secondary schools. This approach was chosen with the assumption that it helps to conduct data as it exists and to gather several data related to the problem under study.

Supporting this idea Sharma (2000:148) stated that survey method is appropriate to gather data from a relatively large number of cases at a particular time. In addition, descriptive survey is the means through which opinions, attitudes, and suggestions for educational practices can be obtained (Kaul, 1996:403) in lemma (2006:42).

The qualitative approach was used to supplement and to get an in depth understanding of complex processes especially related to human behavior that affects the application of mathematics instructional tasks.

3.1. POPULATION AND SAMPLING TECHNIQUES

As mentioned earlier, the study was conducted in Nifas silk-Lafto sub city, Addis Ababa. There are six government secondary schools in the sub city among those schools three of them (50%) were selected as samples randomly by cluster sampling techniques assuming that they represent the case of the other secondary schools in the sub city. To make the study more manageable, mathematics teaching in grade 10 was the target of the study. As a result the sample will be grade 10 students enrolled in 2010/2011, mathematics teachers and principals of the selected schools under study. Since the students are arranged or assigned in their section randomly without any discrimination, then one section was selected from grade 10 sections of each selected schools by using cluster sampling. By purposive sampling three representative students (members student council) were selected for interview.

With respect to the teachers and principals, the researcher was considering grade10 mathematics teachers' of the selected section and each school principals in the selected schools.

The total number of students taken as a sample was 200 out of 1995 number of students in nefas silk lafto sub city government secondary schools. This sample is greater than 5%. Supporting this proportion (Nachmias and Nachmias, 1987: 1995-1996) as cited by Solomon (2000) "increase in the sample size will increase the precision of the sample. But it must be greater than 5%". Thus the indicated sample size was believed to be adequate and representative of the target population.

The researcher believes that the respondents' (students, teachers and school principals of the selected schools in the sub city) are direct stakeholders and as a result they were considered to be relevant as main sources of information for the study. In nefas silk lafto sub city one teacher is assigned for one section as a mathematics teacher. So, in each school the mathematics teacher assigned in each selected section were taken as a sample. In all government schools of Addis Ababa three principals are assigned for each school. Among those principals the one who lead the teaching-learning process was selected as a sample in each school. In three of the schools one student represented each section, and then one student was selected as a sample in each school. Hence, since one section was selected as a sample in each school then three teachers, three principals and three students are taken for interview. To collect data from the scale and tests 200 students were taken. The background information of the students is summarized as follows.

School	population			sample					
	M	F	total	M	%	F	%	Total	%
Fana	340	360	700	23	6.7	31	8.6	54	7.8
Ginbot -20	350	455	805	30	8.6	32	7.0	62	7.7
Lafto	230	260	490	33	14.3	51	19.6	84	17.7
Total	920	1075	1995	86	9.3	114	10.6	200	10.0

The students perception scale and achievement test were administered to 200 students. All copies of completely filled tests were returned. Finally, interview was conducted with three mathematics teachers, three students who are members of the student council and

with three principals. Thus the returned copies of questionnaires and interviews were found to be sufficient to draw inferences for the study.

3.2. SOURCES OF DATA AND DATA COLLECTION TOOLS

The study was used both primary and secondary data sources. The primary data were collected using mathematics perception scale, mathematics achievement test and interviews questions. The secondary source may be published or unpublished documents.

Mathematics perception scale

A Likert type five point scales, ranging from strongly disagree to strongly agree were used to examine perception of instructional task and its components in mathematics learning. The scale was comprised 30 items (statements) which were selected from Eshetie Abebe (2001) and Santosh Gupta (2007) with little modification to individual and group instructional task assignments. The questions were contained in the main title of confidence, usefulness, enjoyment, time and interest.

In the scale equal number of positively and negatively stated items were included for the sake of measuring students' perception instructional tasks in different ways. In the perception scale, positively stated items will score 1,2,3,4 and 5 as strongly disagree, disagree, undecided, agree and strongly agree respectively. For negatively stated items, the scoring were reversed (Kaplan and Saccuzzo, 2001). Thus, a respondent total score on the perception item set were computed as the sum of scores for the individual items.

Mathematics achievement test

Based on mathematics syllabuses and textbooks of grade 10, objectives were formulated and table of specification were prepared. Then after, mathematics achievement test were selected (and modified) from the latest three years of tenth grade Ethiopian national examination by the researcher. The test items were classified at three cognitive levels (Knowledge, comprehension, and application).

The selected and modified test items were used to determine the students' mathematics achievement and to assess the students' degree of attainment of the course objectives. The type question were all multiple choices (closed ended) in order to manage the researcher time and to avoid bias.

Interviews

The interview permits greater depth of response, which may not be possible through any other means. It also enables an interviewer to get information concerning feelings, attitudes or emotions in relation to certain questions (kaul, 1996:168).

In this study, interview was used to collect supplementary information about the students' perception of instructional tasks from grade 10 mathematics teachers and secondary school principals. The number of questions for interview was 6 open ended for selected students, 5 open ended for school principals and 10 open ended for grade 10 mathematics teachers. The students selected for interview were the representative (members of student council) of their section where the studies were conducted.

Document

The selected students last three semester mathematics results were assessed from their school documentation center. After finding the average results the researcher was classify students as high achievers, average achievers and low achievers by adapting the ministry of education criteria as cut off points as cited by (Adane T. and Dawit M., 2000) in Ethiopian journal of education (p.54). That is students who scored 80 and above were labeled as high achievers, those who scored from 50 to 79 were labeled as average achievers and those who scored below 50 were assigned as low achievers.

3.3. PILOT STUDY

A pilot study was conducted with the purpose of improving the instruments and anticipating some unforeseen blunders. The pilot sample were one grade 10 section, two grade 10 mathematics teachers and one principal of Firehiwot no-2 secondary public high school.

The mathematics perception scale and mathematics achievement test were administered to the pilot sample students. The interview questions were also tested. After the instruments had been tested, each question were examined item by item based on the comments of professionals from Addis Ababa university and the results of the pilot study. The face, content and construct validity were established to review the questions.

Item analysis and alpha coefficient of Cronbach were used for analyzing reliability of the instruments. The calculated final cronbachs alpha; for individual task ($\alpha=0.79$), for group task ($\alpha=0.798$) and for achievement test ($\alpha=0.553$). This measure of internal consistency of the instruments were based on the content to which the participants in the study who responded to the perception scale and achievement test items one way responded to other items the same way.

3.4. DATA COLLECTION PROCEDURES

The researcher was first collect letter of co-operation from AAU, Natural science education program unit to the selected high schools. The second step was informing the objective of the study for the concerned body.

In the third step the researcher was given necessary orientations for the respondents on how to complete the perception scale and achievement test and then questionnaires will be distributed in face-to-face situation. The time allotted for mathematics achievement test was 90 minutes. Finally, document analysis, class room observations and interviews were conducted with permissions from concerned personnel.

3.5. DATA ANALYSIS

Depending on the nature of the basic questions and gathered data the following processes were applied for analysis. The collected data were structured, organized and systematically framed the raw data collected from the field using tables. Then the analysis will be done using percentages, correlation, ANOVA, T- test, regression analysis and path analysis. In addition, qualitative data were analyzed by summarizing the words of interviews and the result of observations to substantiate the findings obtained through questionnaires.

CHAPTER FOUR

RESULTS AND DISCUSSIONS

Introduction

This chapter presents analysis and discussion about the data collected through the students' perception scale and achievement test with the help of tables and SPSS 13.1 for window's data software and also using data from interview informants. The last part deals with the data related to factors that influence mathematics instructional tasks using interview responses from grade 10 mathematics teachers, grade 10 students and school principals in the selected schools.

4.1 RESULT AND DISCUSSION OF THE STUDY

The results and discussion of the study were presented by tables followed by interpretation and discussion with related literatures. The data analysis techniques for this study were ANOVA, t- test, correlation and regression and path analysis.

4.2 General statistics:-The general statistics for the mean, standard deviation and number of students in individual task, group task, instructional task and mathematics achievement with respect to sex, achiever level and school are presented in table-1.

Table-1: general statistical data

No.	variables	item		N	Mean	St.deviation
1.	Individual task	sex	Male	86	3.1457	0.37982
			Female	114	3.1462	0.45293
		Achiever level ₂	HA	14	3.2667	0.42083
			A	105	3.1352	0.45040
			L	81	3.1391	0.38445
		School	FANA	54	2.9938	0.40856
			G-20	62	3.0968	0.41338
			LFTO	84	3.2802	0.39970
2.	Group task	Sex	Male	86	3.4470	0.51479
			Female	114	3.5224	0.49228
		Achiever level	HA	14	3.5696	0.51334
			A	105	3.4254	0.52308
			L	81	3.5600	0.46613
		school	FANA	54	3.4309	0.49343
			G-20	62	3.4118	0.50822
			LFTO	84	3.5857	0.49321
3.	Instructional task ₁	Sex	Male	86	3.2973	0.35547
			Female	114	3.3348	0.41985
		Achiever level	HA	14	3.4190	0.34461
			A	105	3.2806	0.42008
			L	81	3.3506	0.34461
		School	FANA	54	3.2123	0.38577
			G-20	62	3.2543	0.37612
			LFTO	84	3.4345	0.38365
4.	Mathematics achievement	Sex	Male	86	40.47	13.086
			Female	114	42.89	14.184
		Achiever level	HA	14	50.64	12.270
			A	105	40.77	14.136
			L	81	42.02	13.026
		school	FANA	54	34.28	12.539
			G-20	62	47.05	12.174
			LFTO	84	43.17	13.545

-
- 1- Perception of instructional task is the average of perception of individual tasks and group tasks
2- HA-high achiever, A- average achiever, L- lower achiever

The data presented in table -1 gives the general over view about the data collected from tests and document analysis. In the table the students' response to the given tests are presented in descriptive form like mean and standard deviation by grouping students with sex, level of previous mathematics achievement and schools.

4.3 Results and Interpretation of data obtained through students perception scale, achievement test and document analysis of the study.

In this study ANOVA (analysis of variance) was used to test the proposed hypothesis or to analyze the difference in students' perception of individual task, group task, instructional tasks and mathematics achievement with respect to sex, previous mathematics achievement and schools using tables 2,3and5. And for those statistically significant variables Tukey tests are used to identify which specific pairs of means are significantly different using tables 4,6,7and 8 presented as follows.

H₀₁: There is no significant difference in students' perception of individual task, group task, instructional tasks and mathematics achievement with respect to sex.

Table-2:One-way ANOVA for the perception of individual task, group task, instructional tasks and mathematics achievement with respect to sex.

Variables	Mean		Std.deviation		F	Sig.
	F	M	F	M		
Individual task	3.1462	3.14574	.45293	.37982	.000	.994
Group task	3.5224	3.4470	.49228	.51479	1.105	.294
Instructional task	3.3348	3.2973	.41985	.35547	.445	.505
Mathematics achievement	42.89	40.74	14.184	13.086	1.204	.274

As indicated in table-2 for individual task $F(2,197) = 0.000$ with $p = 0.994$, for group task $F(2,197) = 1.105$ with $p = 0.294$, for instructional tasks $F(2,197) = 0.445$ with $p = 0.505$ and for mathematics achievement $F(2,197) = 1.204$ with $p = 0.274$.

Since all the p values are greater than 0.05, this indicates that the means and standard deviations of the predictor (sex) and dependent variables (individual task, group task, instructional tasks and mathematics) have no significant difference.

Then male and female students had no statistically significant difference in their perception of individual task, group task and instructional tasks and also their mathematics achievement. Hence the null hypothesis is accepted for all variables.

Therefore, male and female students had similar perception of individual task, group task, instructional tasks and mathematics achievement. Their mean score and standard deviation are almost equal in each of the instructional tasks and mathematics achievement. This result is in harmony with the studies of Hilton and Berglund (1974), Seleshi (2001) and Tadesse (2006). They reported that at fifth grade to high school boys and girls did not show a statistically significant difference in mathematics achievement.

In disagreement with the findings of the study Sewnet (1995), Nema and wager (1001) and Adugna (2004) found out that boys had significant higher mathematics achievement scores than girls in the age of thirteen to sixteen. In consistent with it, Marsha,et al., (1995) and Felson and Trudeau (1991) reported that fifth grade to tenth grade girls as compared with boys had substantially higher mathematics achievement scores than that of boys. Similarly, seleshi (2001) reported that, in Ethiopian context, boys do better than girls in mathematics achievement beginning from grade sixth through high school. Furthermore, genet (2004) NOE (2001), Anbesu and Barbara (1998) and Adugna (2004) revealed that girls' mathematics achievement was significantly lower than that of boys.

In table-2 the mean for boys and girls in mathematics achievement were 40.74 and 42.89 respectively. This implies girls achieve mathematics better than boys. In my own seven years of teaching experience, I have observed that the number of females' top scorer in mathematics was improved time to time and even better than boys.

In disagreement with the findings of the study Genet (1998) reported that *20% "of the total participant female students, Addis Ababa, did not have enough time to do their assignment(s) because females spent most of their time doing house work activities"* (p.61). So one may infer that, the little time available for study as well as doing home

work (instructional tasks) could partly explain the lower performance of girls in mathematics achievement.

This explanation is supported by a study by Adane and Dawit (2006) in which doing home work (instructional task) has been found to be an important predictor for mathematics achievement.

But generally, the students' mathematic achievement were very small than expected. The possible reason for poor performance of students, as revealed by interview informants, might be lack of students' interest, lack of teachers' interest, learning facilities such as (books in the library, laboratory equipments mathematical, soft ware like geometric sketch pad), lack of training for teachers, students' family socio-economic status, etc. supporting the above suggestion In Portugal, studies conducted in schools that had confronted and reduced failure rates highlight the importance of variables such as (a) school organization, including a collaborative environment with parental involvement; (b) relevant curriculum and classroom activities; and (c) the quality of science teaching, including teacher support and expectancies (Fonseca, 2003).

H_{02} :- There is no significant difference in students' perception of individual task, group task, instructional tasks and mathematics achievement with respect to previous mathematics achievement.

Table-3: One-way ANOVA for perception of individual task, group task, instructional tasks and mathematics achievement with respect to previous mathematics achievement.

Variables	Levels of achievement	Mean	Std,deviation	F	Sig.
Individual task	Lower	3.1391	.38445	.615	.542
	Average	3.1352	.45040		
	Higher	3.2667	.42083		
Group task	Lower	3.5600	.46613	1.848	.160
	Average	3.4254	.52308		
	Higher	3.5696	.51334		
Instructional task	Lower	3.3506	.34461	1.219	.298
	Average	3.2806	.42008		
	Higher	3.4190	.43847		
Mathematics achievement	Lower	42.02	13.026	3.266	.040
	Average	40.77	14.136		
	Higher	50.64	12.270		

Table-3 above shows that for individual task $F(2,197) = 0.615$ with $p > 0.05$, for group task $F(2,197) = 1.848$ with $p > 0.05$ and for instructional task $F(2,197) = 1.219$ with $p > 0.05$. 2 and 197 are the degree of freedom (df) for the between groups "effect" and the within groups "error", respectively. This implies students' perception of individual task, group task and instructional tasks had no significant difference high, average and low achiever students.

Therefore, students' perceptions of instructional tasks were not different with respect to previous mathematics achievement. Hence the hypothesis is accepted for the variable individual task, group task and instructional tasks.

For mathematics achievement $F(2,197) = 3.266$ with $p = 0.04$. 2 and 197 are the degree of freedom (df) for the between groups "effect" and the within groups "error", respectively. This shows that students' mathematics achievement with respect to students' previous mathematics achievement had significant difference. There is a change in between students' level of previous mathematics achievement and current mathematics achievement. Hence, in this study there is no evidence to accept the proposed hypothesis in the variable mathematics achievement. Now in order to see which variables made more significant difference between higher, average and lower achievers, Tukey test was used.

Table-4: Tukey HSD for mathematics achievement

(I)achiever level	(J)Achiever level	Mean Difference (I-J)	Std.Error	Sig.	95% confidence Interval	
					Lower bound	Upper bound
average	lower	-1.253	2.008	.807	-5.99	3.49
higher	lower	9.618	3.930	.075	-0.66	17.9
higher	average	9.871*	3.863	.030	.75	18.99

*the mean difference is significant at the 0.05 level.

Table-4 above shows that, mathematics achievement in higher achiever made statistically significant difference with average achiever which had mean difference of 9.871 and significant level of $0.05(p < 0.05)$.

But higher achiever made no statistically significant difference with low achiever which had mean difference of 9.618 and $p > 0.05(p = 0.075)$ and lower achiever made no statistically significant difference with average achievers which had mean difference of 1.253 and $p = 0.807$. What are the possible suggestions for such a difference? Now to analyze these differences the researcher uses the table-5 with interview data as follows.

Table-5^a: Paired sample statistics and paired sample t-test for previous achiever levels and current achiever levels

Pairs	N	Paired sample statistics				Paired sample test				
		mean	SD.	r	Sig.	Mean difference	SD.	t	df	sig
Pre. Lower	81	41.27	7.445	0.054	0.635	7.432	11.69	5.719	80	0.000
Cur. lower	153	33.84	9.428							
Pre. Average	105	58.72	7.499	0.287	0.021	1.016	7.855	1.034	63	0.305
Cur. average	64	57.7	5.332							
Pre. Higher	14	80								
Cur. higher	1	81								

Key  Indicates that the correlation and t- value for the pairs prior higher achiever with current higher achiever can't be computed because the sum of case weights is less than or equal to 1.

As we see from the above pair wise comparison the number of low achievers increased from 81 to 153, the number of average achiever decreased from 105 to 64 and the number of high achievers also decreased from 14 to 1. the mean difference between previous and current low achievers were highly significant but not for others. This is because a student who was grouped as high achiever after achievement test becomes either low or average achiever. Such misplacement holds true for lower and average achievers. Now this indicates that the students who were grouped as high, average and low achiever did not keep as high, average and low achievers respectively.

Since the researcher of this study discussed the results of table-4 at an angle of student's previous mathematics achievement, so the result followed table-4 will not surprising. Because our students learn in unfavorable learning conditions discusses in the last part of this chapter. In support of this idea one of Fana high school teacher said from his experience that the students' who were active participant in a class failed some times in SCCELCE.

H_{03} : There is no significant difference in students' perception of individual task, group task, instructional tasks and mathematics achievement with respect to school.

Table-6:-One-way ANOVA for perception of individual task, group task, instructional tasks and mathematics achievement with respect to school.

Variables	Levels of achievement	Mean	Std,deviation	F	Sig.
Individual task	FANA	2.99	0.409	8.819	0.000
	G-20	3.10	0.413		
	LFTO	3.28	0.399		
Group task	FANA	3.43	0.493	2.697	0.070
	G-20	3.41	0.508		
	LFTO	3.59	0.493		
Instructional task	FANA	3.21	0.386	6.838	0.001
	G-20	3.25	0.376		
	LFTO	3.43	0.384		
Mathematics achievement	FANA	34.28	12.539	14.848	0.000
	G-20	47.05	12.174		
	LFTO	43.17	13.545		

*the mean difference is significant at the 0.05 level

In Table-6 above $F(2,197) = 8.819$ with $p=0.000$ for individual task, $F(2,197) = 2.697$ with $p=0.07$ for group task, $F(2,197) = 6.697$ with $p=0.001$ for instructional task and $F(2,197) = 14.848$ with $p=0.000$. This implies that individual task, instructional tasks and mathematics achievement had significant difference among the schools (fana, ginbot 20 and lafto secondary schools).

Hence there is no evidence to accept the null hypothesis in this study for the variables individual task, instructional tasks and mathematic achievement. But group task among the three schools had no significant difference thus the proposed hypothesis is accepted for group task. Now in order to see which variables made more significant difference between the three secondary schools Fana, Ginbot-20(g-20) and Lafto in the variables individual task, instructional task and mathematics achievement, Tekey tests in tables 7, 8 and 9 are used.

TABLE-7: Tukey HSD for the difference in students' perception of individual task among Fana, Ginbot-20 and Lafto secondary schools.

Multiple comparisons

Dependent variable: individual task

Tukey HSD

(I)school	(J)school	Mean Difference (I-J)	Std.Error	Sig.	95% confidence Interval	
					Lower bound	Upper bound
Fana	Ginbot-20	-0.10295	0.07564	0.363	-0.2816	0.0757
Fana	Lafto	-0.28633*	0.07088	0.000	-0.4537	-0.1189
Lafto	Ginbot-20	0.18338*	0.06804	0.021	0.0227	0.3441

*the mean difference is significant at the 0.05 level

In table-7 above the mean difference for the students perception of individual task between Lafto secondary school and Fana secondary school was 0.28633 with a high significant level of $p=0.000$ and the mean difference between Lafto and Ginbot-20 was 0.18338 with significant level of 0.021. But the mean difference between Ginbit-20 and Fana was 0.10295 with $p=0.363$. Therefore, this implies that the students' perception of individual task in Lafto Scondary School had statistically high significant difference with Fana and ginbot-20 but Ginbot 20 had no statistically significant difference with Fana secondary school students.

From the above comparison Lafto secondary school students' had high individual task perception than Lafto and Ginbot -20 secondary schools, the possible reason for such a difference may be Lafto secondary school's best practices. For example, as we see from interview informants (Lafto secondary school principals and teachers), reported that, "in the school every teachers were assigned at least three times a week to support students after school for doing mathematical exercises." This might play very good role for the students to develop individual task perception since they had teachers' assistance for the questions which are difficult.

TABLE-8: Tukey HSD for the difference in instructional tasks among Fana, Ginbot-20 and Lafto secondary schools.

Dependent variable: instructional tasks

Tukey HSD

(I)school	(J)school	Mean Difference (I-J)	Std.Error	Sig.	95% confidence Interval	
					Lower bound	Upper bound
Fana	Ginbot-20	-0.04196	0.07109	0.826	-0.2098	0.1259
Fana	Lafto	-0.22218*	0.06661	0.003	-0.3795	-0.0649
Lafto	Ginbot-20	0.18022*	0.06394	0.015	0.0292	0.3312

*the mean difference is significant at the 0.05 level

In the table-8 above the mean difference in students perception of instructional tasks between Lafto and Fana was 0.22218 with $p=0.003$. The mean difference in students' perception of Instructional task between Lafto and Ginbot-20 was 0.18022 with $p=0.015$. But the mean difference between Ginbot-20 and Fana was 0.04196 with $p=0.826$. Hence, Lafto secondary school had statistically significant difference with Ginbot-20 and Fana secondary schools in perception of instructional tasks. But Ginbot-20 and Fana had no statistically significant difference with Fana secondary school in perception of instructional task.

Students' instructional task perception of lafto secondary school is better than either ginbot-20 or fana. The reason behind might be the schools best practices expressed by the school principals and mathematics teachers discussed before since mathematics instructional task includes mathematics individual task and group task.

TABLE-9: Tukey HSD for the difference in students' mathematics achievement among Fana, Ginbot-20 and Lafto secondary schools.

Multiple comparisons

Dependent variable: mathematics achievement

Tukey HSD

(I)school	(J)school	Mean Difference (I-J)	Std.Error	Sig.	95% confidence Interval	
					Lower bound	Upper bound
Fana	Ginbot-20	-12.771*	2.395	0.000	-18.43	-7.12
Fana	Lafto	-8.889*	2.244	0.000	-14.19	-3.59
Lafto	Ginbot-20	-3.882	2.154	0.172	-8.97	1.20

*the mean difference is significant at the 0.05 level

In table-9 the mean difference in students' mathematics achievement between Fana and Ginbot-20 was -12.771 with $p=0.000$ and between Fana and Lafto was -8.889 with $p=0.000$. But the mean difference between Lafto and Ginbot-20 was -3.882 with $p=0.172$. From these data we can deduce students' mathematics achievement of Fana secondary school to that of Ginbot-20 and Lafto had statistically high significant differences. But students' mathematics achievement in between Ginbot-20 and Lafto secondary school was statistically insignificant.

Ginbot-20 principal in the time of interview said that *"in our school the teachers did not leave the school at any time until the end of the last period even though the number of teachers in the school is enough to get out of school after they finish their task. This is because if the teachers are available at school any time, the students family, who are asked to come to school, can discuss about their children how to improve their result."* As he said this is one mechanism for improving students' achievement. And one of the mathematics teacher said that *"the school library had enough books either for teachers and students. Any student or teacher can use books any time he wants."*

The possible reason for Availability of enough books in Ginbot-20 might be due to its long years of experience comparing to Fana and Lafto secondary schools. Fana and Lafto secondary schools are inaugurated in the resent two years while Ginbot-20 inaugurated ten years before. So Ginbot-20 secondary school had a chance to collect books in its ten years of experience than Lafto and Fana. Clearly, we know that availability of books play decisive role in students' achievement.

Generally, in the schools taken as a sample, there were significant differences in students' perception of individual task, instructional tasks and mathematics achievement to each other. These schools are government schools in a nefas silk-lafto sub city.

In these three schools number of teachers, number of students in a class and all the school facilities are nearly equal. How the schools differ in such a way? As we see from Ginbot-20 experience,

- Availability of books in the library helps teachers for the preparation of daily lesson and to present summarized notes for their students.
- Teacher and students' family interaction play decisive role in the change of students' mathematics achievement through advising low achiever students to improve.
- The teachers and the school leader's commitment was another important factor in the change of students' achievement.

In support of this idea House (2001:31) identified several classroom strategies that were associated with the mathematics achievement of adolescent students in Japan; students who indicated that their teachers more frequently explained the rules and definitions when learning new topics and that they more frequently tried to solve an example related to the new topic tended to show higher mathematics test scores.

In addition, students who reported that their teachers more frequently gave them homework, showed them how to do mathematics problems, and more frequently used things from everyday life for solving mathematics problems tended to have higher mathematics test scores (House, 2001).

Social-cognitive theory espouses the premise that both environmental factors, such as classroom structures and expectations, and students' motivational beliefs, such as task interest (interest of group task individual task) and self-standards, exert deterministic

influences on students' cognitive and behavioral engagement in school (Bandura, 1997; Zimmerman, 2000). This may also be a case for the change in our schools.

PAIRED T-TEST

The paired t-test is used to investigate the relationships between two groups where there is a meaningful one-to-one correspondence between the data points in one group and those in the other. Or it is used to determine if a difference exists between the means of two groups. Accordingly the researcher of this study used to test H_{04} or to analysis the statistical significance difference between students' perception of individual task and group task with respect to the total number of students, sex; previous mathematics achievement and school using table-10.

H₀₄: There is no significant difference in students' perception of Individual task and Group task with respect to the total number of students, sex, previous mathematics achievement and school.

Table-10: Paired sample statistics and paired sample T-test for total students, sex, achiever level and school

variable		Tasks	Paired sample statistics		Paired sample test				
			mean	SD	mean	SD	t	df	Sig.
Total		Individual	3.1460	0.422	-0.344	0.495	-9.83	199	0.000
		group	3.4900	0.502					
Sex	F	Individual	3.1462	0.453	-0.376	0.438	-9.18	113	0.000
		group	3.5224	0.492					
	M	Individual	3.1457	0.379	-0.301	0.561	-4.97	85	0.000
		group	3.4470	0.515					
Achiever level	higher	Individual	3.2667	0.421	-0.303	0.339	-3.34	13	0.005
		group	3.5696	0.513					
	Average	Individual	3.1352	0.450	-0.290	0.499	-5.95	104	0.000
		group	3.4254	0.523					
	Lower	Individual	3.139	0.384	-0.421	0.506	-7.49	80	0.000
		group	3.56	0.466					
School	Fana	Individual	2.993	0.409	0.437	0.475	-6.76	53	0.000
		group	3.430	0.493					
	Ginbot-20	Individual	3.097	0.413	-0.315	0.540	-4.59	61	0.000
		group	3.411	0.508					
	Lafto	Individual	3.280	0.399	-0.306	0.469	-5.97	83	0.000
		group	3.586	0.493					

From table-10 above: From paired sample statistics, for the total number of students' perception of individual task and group task, the means are 3.146 and 3.490 respectively. And their standard deviations are also 0.422 and 0.502 respectively. From paired sample test the difference of the means for individual task and group task is -0.344 among the total number of students.

The total number of students taken as a sample had statistically significant difference in their perception of individual task and group task. That is from paired sample test $t(199) = -9.83, p=0.000$. This sample indicates that the students' perception of individual task had on average significantly lower than the perception in group task. Hence students' had good group task perception than individual task.

The means for female students' perception of individual task and group task are 3.1462 and 3.5224 in paired sample statistics. Their standard deviations to the indicated variables are 0.453 and 0.492 respectively. The difference of the mean to that of female students' perception of individual task over group task is -0.376. As indicated in paired sample test the female students' perception of individual task had on average significantly lower than the perception of group task, $t(113) = -9.18, p=0.000$.

The means for male students' perception of individual task and group task are 3.1457 and 3.447 respectively and their standard deviations are 0.379 and 0.515 from paired sample statistics. The difference of the means in paired sample test is -0.301. The paired sample test indicates that the male students' perception of individual task had on average significantly lower than the perception of group task, $t(85) = -4.97, p = 0.000$. But in disagreement with this study Timothy J. (2009) said that girls reported more frequent use of individual task ($M=3.46, SD=.67$) during studying for math and completing math homework assignments than boys ($M=3.24, SD=.71$). This effect is considered small ($p=.301$). He also compared girls and boys individual task interest differences. That is $F(1,868) = 5.6, p=.018$, with girls displaying higher levels of interest ($M=3.61, SD=.67$) than boys ($M=3.43, SD=.91$).

From table-10 above, we have:-

- higher achiever students' perception of individual task had on average slightly lower than the perception in group task, $t(13) = -3.34, p=0.005$
- Average achiever students' perception of individual task had on average significantly lower than the perception in group task, $t(104) = -5.95, p=0.000$
- Lower achiever students' perception of individual task had on average significantly lower than the perception in group task, $t(80) = -7.49, p=0.000$

- Fana secondary school students perception of individual task had on average significantly lower than the perception in group task $t(53)=-6.76, p=0.000$
- Ginbot-20 secondary school students' perception of individual task had on average significantly lower than the perception in group task $t(61)=-4.59, p=0.000$
- Lafto secondary school students' perception of individual task had on average significantly lower than the perception in group task, $t(83)=-5.97, p=0.000$

Now generally speaking, there are significant differences in students' perception of individual task and group task with respect to the total students taken as a sample, sex, previous mathematics achievement and schools. Hence there is no evidence to accept proposed hypothesis in this study.

In all cases group tasks are favored than individual tasks. From this finding we can understand that students, teachers and principals had positive perception to group task than individual task in our school system. The newly revised grade 10 teacher's guide said that *"teamwork is emphasized in a student-centered classroom. For example, the teacher creates favorable conditions for students to come together in groups and exchange ideas about what they have learned and about material they read."* This implies every members of the school community are responsible to implement group task strategies in their school system. So, the reason behind, for the students having significant perception of group task than individual task, might be the teachers and the principal's commitment to implement group task strategies.

As the researcher reviewed in chapter two of this study working collaboratively allows students to tackle more complicated and more conceptually difficult problems. Unfortunately, when students evaluate their sense of competency based on peer performance and also experience a decreased sense of autonomy, they are more likely to exhibit maladaptive motivational behaviors, such as poor effort and persistence (Reeve & Jang, 2006; Zimmerman, 2000). We know that use of group task is unquestionable. But to overcome such a problem the teachers, the students and the school principals must follow the proper guide lines for group task strategy to perform their own share.

Multiple regression analysis:

Multiple regression analysis is a statistical technique that allows us to predict someone's score on one variable on the basis of their scores on several other variables using principles of correlation and regression. If two variables are correlated, then knowing the score on one variable will allow you to predict the score on the other variable. The stronger the correlation, the closer the scores will fall to the regression line and therefore the more accurate the prediction. Multiple regressions are simply an extension of this principle, where we predict one variable on the basis of several other variables. Having more than one predictor variable is useful when predicting human behavior, as our actions, thoughts and emotions are all likely to be influenced by some combination of several factors. Using multiple regressions we can test theories (or models) precisely which set of variables is influencing our behavior.

Accordingly, the researcher of this study was used regression analysis test H_{05} or to analyze the statistical significant relationship between individual task and group task with instructional tasks using table-11 and relationship between individual task and group task with mathematics achievement using table-12.

H_{05} : there is no significant relationship between individual task and group task with instructional tasks and mathematics achievement.

Table-11: regression Analysis for instructional tasks with individual task and group task.

R=1.00				R ² =1.00		
ANOVA Table						
Model	Sum of squares	df	Mean square	F	Sig.	
Regression	30.726	2	15.363	1416605	0.000	
Residual	0.002	197	0.000			
Total	30.728	199				
Variables in the equation						
variable	r	B	Std.error	β	t	Sig.
Individual Task	0.816	0.498	0.001	0.535	810.066	0.000
Group Task	0.877	0.502	0.001	0.642	971.876	0.000

**. Correlation is significant at the 0.001 level & *. Correlation is significant at the 0.05 level

In the regression table-11,

Since $F(2,197) = 1416605$ with $p=0.000$, the F value indicates that the multiple correlations R were significant. That is the contribution of the variables individual task and group task collectively were affected the students' perception of instructional tasks significantly. The r values indicate that the correlation of the predictors (individual task and group task) and dependent variables (instructional tasks). According to table-10, the r value for individual task and group task are 0.816 and 0.877 respectively. These numbers reveal that individual task and group task are highly correlated with instructional tasks.

Similarly, t values indicate that the contribution of each of the variables individual task and group task in mathematics were significantly affected instructional tasks in mathematics. Clearly, this implies that the students' perception of individual task and group task had a positive effect to students' perception of instructional tasks.

The beta (β) value is a measure of how strongly each predictor variable influences the criterion variable. The beta is measured in units of standard deviation. From table-10, a beta value of 0.535 indicates that a change of one standard deviation in the predictor variable (individual task) will result in a change of 0.535 standard deviations in the criterion variable (instructional tasks).

Thus, the higher the beta value the greater the impact of the predictor variable on the criterion variable. Now since the β - value for group task is 0.642, we can say that students' perception of group task dominates students' perception of individual task in instructional tasks.

Since $R^2=1.00$ for Mathematics then the two variables individual task and group task had 100% effect or contribution on instructional tasks.

The percent of effect or contribution of each component individual task (in) and group task (gr.). On instructional tasks in mathematics can be found by:

Regression Equation Model: - $Y = \beta_{in}r_{in} + \beta_{gr}r_{gr}$

Where Y = instructional task

in = individual task and

gr = group task

$$(R^2 = \beta_{in}r_{in} + \beta_{gr}r_{gr}) \times 100\%$$

$$(1.00 \approx 0.535 \times 0.816 + 0.642 \times 0.877) \times 100\%$$

$$100\% \approx 43.656\% + 56.3\%$$

Therefore, the contribution of students' perception of individual task in mathematics statistically enhances the students' perception of instructional tasks by 43.656% and the students' perception of group task also enhances the students' perception of instructional tasks by 56.3%. These indicate that students' perception individual task and group task had very high contribution to students' perception of instructional tasks in mathematics. Hence, the null hypothesis is not accepted in this study to the variable instructional tasks.

Table-12: regression Analysis for mathematics achievement with individual task and group task.

R=0.093			R²=0.009			
ANOVA Table						
Model	Sum of squares	df	Mean square	F	Sig.	
Regression	322.955	2	161.478	0.855	0.427	
Residual	37192.865	197	188.796			
Total	37515.820	199				
Variables in the equation						
variable	r	B	Std.error	β	t	Sig.
Individual Task	0.046	0.212	2.567	0.007	0.082	0.934
Group Task	0.093	2.454	2.157	0.09	1.137	0.257

**, Correlation is significant at the 0.001 level & *. Correlation is significant at the 0.05 level

In the regression table-12 above:

F (2,197) = 0.855 with p=0.427>0.05, then F value indicates that the multiple correlations R were not significant that is the contribution of all variables individual task and group task collectively were not significantly affected the achievement of students in mathematics.

The r- values for individual task and group task are equal to 0.046 and 0.093 respectively. This indicates that individual task and group task had negligible correlation with mathematics achievement.

The t-values indicate that each of the variables individual task and group task in mathematics were not significantly affected the achievement of mathematics.

From regression table-12, since $R^2=0.009$ for mathematics then the two variables individual task and group task in mathematics had 0.9% effect or contribution on mathematics achievement.

The percent of effect or contribution of each component individual task and group task on the achievement of students in mathematics can be found by Regression Equation Model:

$$Y = \beta_{in}r_{in} + \beta_{gr}r_{gr} \quad \text{Where } Y = \text{mathematics achievement}$$

in= individual task and

gr= group task

$$(R^2 = \beta_{in}r_{in} + \beta_{gr}r_{gr}) \times 100\%$$

$$(0.009 \approx 0.007 \times 0.046 + 0.09 \times 0.093) \times 100\%$$

$$0.9\% \approx 0.0322\% + 0.837\%$$

Therefore, the contribution of students' perception of individual task in mathematics enhanced the achievement of mathematics by 0.0322% and the students' perception of group task enhances the students' mathematics achievement by 0.837%. This indicates that impacts of students' perception of individual task and group task on mathematics achievement statistically were 0.9%. The remaining 99.1% of the achievement of mathematics were affected by other variables which was not included in the perception scales of instructional tasks and its components of this study. That is the students might be affected by the student related factors, teacher related factors and school related factors reviewed in this study. As Covington (2000) found, the academic and social goals that students bring to class are important factor for achievement. The possible factors that students bring to class as reviewed from interview informants are mainly socio-economic factors, infrastructure, future job opportunity and etc.

Mulugeta A. (2011) has also reviewed the possible factors that affect students' mathematics achievement in support of this study as follows:

“Cognitive factors (L. R. Aiken, 1971; J. P. Guilford, R. Hoepfner, and H. Peterson, 1965;

Aiken, 1971; Fennema, 1975; Sherman, 1967) like logical thinking, spatial perception, verbal ability and problem solving ability, etc;

Affective factors (Boswell, 1985; Guilbert, 198 Aiken, 1972, 1974; Armsbong, 1985; Patel, 1984) like family influences and personality variables, namely, self reliance, sense of personal freedom, feeling of belongingness, withdrawing tendencies, nervous symptoms, social skills, general anxiety and test anxiety, parental profession, etc;

Educational environment factors (cf. Fennema, 1978; Leder, 1987, 1990 and Becker, 1991; Gwizdala and Steinbach, 1990; Fennema & Peterson, 1985) like attitudes of teachers, textbooks, co-educational school organization, classroom environment, the relationship between teacher behavior and student learning, teachers' qualifications, class size, encouragement to teacher by the head, use of audio-visual aids, feedback, imparting of limited knowledge, blind use of rules, defective textbooks, insufficient drill work, inadequate coverage of the syllabus, inadequate attention to difficult topics and a personal factor, namely, lack of motivation, student characteristics (e.g., use of learning strategies), home environment (e.g., occupation of parents), and school context (e.g., quality of instruction), etc.”

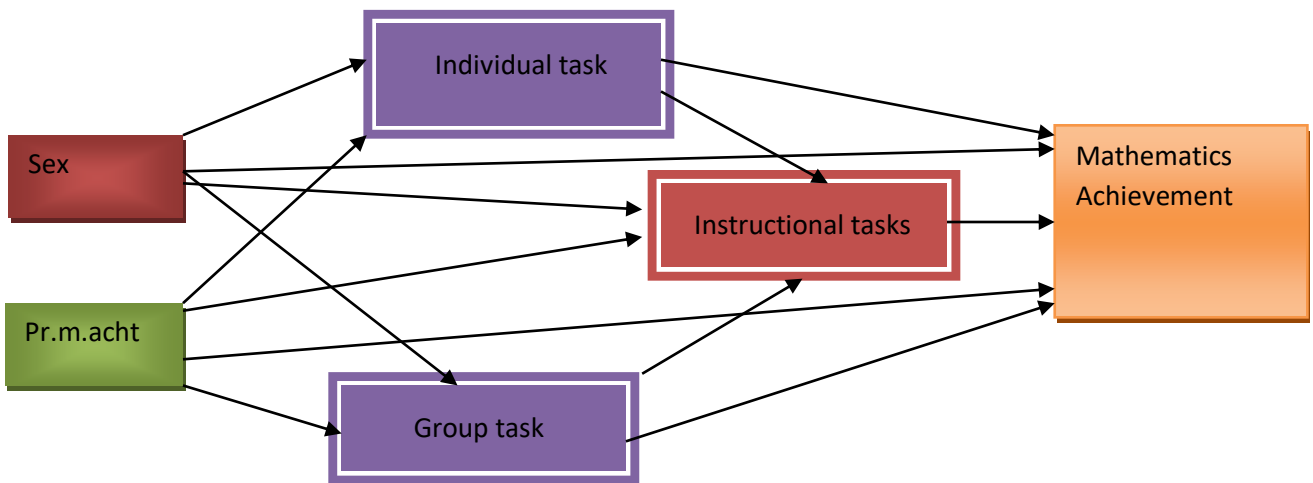
According to Yilma, T. (2011) families' socioeconomic status is a serious implication on the academic performance of students. His finding was supported by Onwuamanam, (1991) when he concluded that parents who are educated and have high socioeconomic status can offer academic follow up support which is necessary when learning mathematics because of the sequential nature of the subject.

Path analysis is used to determine the direct and indirect effect of one variable on the other variables. Accordingly the researcher of this study was used path analysis to test H_{06} or to analysis the statistical significant impact of the variables sex, previous mathematics achievement, student's perception of individual task, group task and instructional tasks on mathematics achievement. For path analysis tables-13 and 14, figures-1 and 2 are used.

H₀₆: there is no significant impact of sex, previous mathematics achievement, individual task, group task and instructional tasks on mathematics achievement.

Path analysis (structural model for mathematics achievement)

Figure 1: Initial path model for Mathematics Achievement



Structural path analytic model in figure-1 was used to investigate the role of the variables sex, previous mathematics achievement, individual task, group task and instructional tasks on students' mathematics achievement and to identify the direct and indirect effects of these variables on each other.

Table 13: decomposition of effects from the path analysis in mathematics (*p<0.05)

Effect	B -Parametric estimate	β-Standardized estimate	t	R²
On mathematics achievement				0.020
Of Sex	-1.996	-0.72	-1.013	
Of Achiever level	1.791	0.079	1.103	
Of Individual task	-2.417	-0.074	-0.600	
Of Group task	0	0	0.606	
Of Instructional tasks	4.989	0.143	1.152	
On Instructional tasks				1.000
Of Sex	0.001	0.001	1.287	
Of Achiever level	0.000	0.000	-0.497	
Of Individual task	0.498	0.535	806.287*	
Of Group task	0.503	0.642	962.964*	
On Individual task				0.002
Of Sex	-0.001	-0.001	-0.016	
Of Achiever level	0.031	0.044	0.623	
On Group task				0.011
Of Sex	-0.074	-0.073	-1.037	
Of Achiever level	-0.062	-0.075	-1.052	

Table 14: Direct, indirect and Total Effects of Variables on Achievement

Effect	r	Direct effect- β	Indirect effect	Total effect
On mathematics achievement				
Of Sex	-0.078	-0.072	0	-0.072
Of Achiever level	0.071	0.079	0	0.079
Of Individual task	0.046	-0.074	0.076362	0.002362
Of Group task	0.093	0	0.091806	0.091806
Of Instructional tasks	0.084	0.143	0	0.143
On Instructional tasks				
Of Sex	-0.047	0.001	0	0.001
Of Achiever level	-0.025	0.000	0	0.000
Of Individual task	0.816*	0.535*	0	0.535
Of Group task	0.877*	0.642*	0	0.642
On Individual task				
Of Sex	-0.001	-0.001	0	-0.001
Of Achiever level	0.044	0.044	0	0.044
On Group task				
Of Sex	-0.075	-0.073	0	-0.073
Of Achiever level	-0.076	-0.075	0	-0.075

*P<0.05

From table-13 and 14 above, the researcher of this study observe the following interpretations:

- Sex and previous mathematics achievement statistically had no significant direct and indirect effect to mathematics achievement. Similarly, sex and previous mathematics achievement had no direct and indirect effect to individual task, group task and instructional tasks. This implies that students' perception of individual task, group task, instructional tasks and students' mathematics achievement were not statistically predicted by sex and students' previous mathematics achievement.
- The effects of students' perception of individual task in mathematics on mathematics achievement were more indirect than direct but the effects of students' perception of group task were more direct than indirect. In addition, individual task and group task had a significant direct effect on instructional tasks.
- Sex, previous mathematics achievement, perception of individual task, perception of group task and instructional task had negligible correlation with mathematics achievement.
- Sex and previous mathematics achievement had negligible correlation to perception of instructional tasks while perception of individual task and group task had highest correlation with instructional tasks.
- Sex and previous mathematic achievement had negligible correlation to both variables perception of individual task and group task.

figure 2: Final path model for mathematics achievement

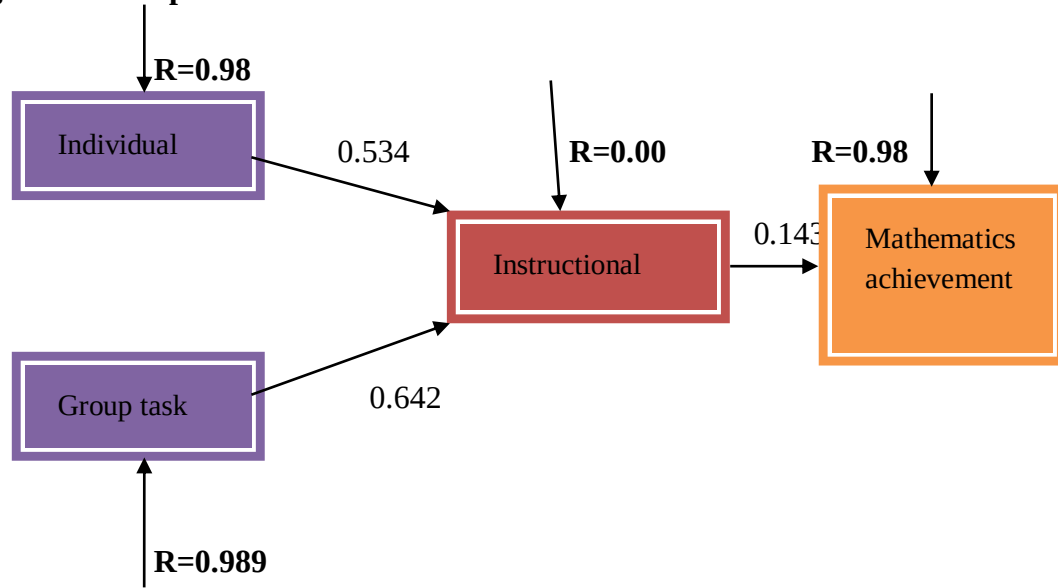


Figure -2 illustrates the path analytic model with non significant path removed. It provides for ease of interpretation and to show the residual path coefficients (R). i.e.

- i. $R(\text{mathematics achievement}) = 1 - R^2 = 1 - 0.02 = 0.98$
- ii. $R(\text{instructional task}) = 1 - R^2 = 1 - 0.00 = 1.0$
- iii. $R(\text{individual task}) = 1 - R^2 = 1 - 0.002 = 0.98$
- iv. $R(\text{group task}) = 1 - R^2 = 1 - 0.011 = 0.98$

These coefficients (R values) represent factors that affect specific variables but that were not measured or accounted for in this model. That means for example 98% of the factors that affect students' mathematics achievement is out of the indicated variables in this study. Mathematics achievement of secondary school students were considered to be a function of Sex, pervious mathematics achievement, students' perception of individual task, group task and instructional tasks in mathematics.

Of all path coefficients from the independent variables to mathematics achievement, almost none of them were significant but instructional task to mathematics achievement were very small. Individual task and group task had strong direct effect to instructional tasks since instructional tasks are the average of individual task and group task. Individual task and group task had slight indirect effect to mathematics achievement. Hence the hypothesis is accepted.

As we see from the above result the students' previous mathematic achievement had no significant effect on mathematics achievement. In disagreement with this research, research undertaken by Yates' (2000) revealed that prior achievement in mathematics was highly predictive of later achievement in mathematics. This study was conducted in South Australia and drew on the results of students aged between 8 and 12 years. Similarly, Reynolds (1991) found that previous achievement was a chief predictor of Grade 10 mathematics and science knowledge and Hemmings (1996) showed that prior school achievement in English, mathematics, and science, based on standardized Year 10 examination results in New South Wales, (NSW), Australia, was significantly related to Year 12 Tertiary Entrance Rank (TER). Strikingly, a Year 10 composite measure of these three subjects accounted for over 60 percent of the explained variance in the TER. But Bandura (1997) on the other hand argued that the uncertainty for one's capability can overthrow the results of his/her efforts, even if he/she is a highly competent person with respect to a certain task. According to his suggestions teachers must thus work towards the development of efficacy beliefs and pay attention to students' self perceptions with respect to certain tasks such as individual task and group task, since these beliefs can be an indicator of future achievement in the specific tasks.

Therefore it is argued that one's behavior is more influenced by his/her beliefs than by his/her knowledge or ability, teachers should pay as much attention to students' perceptions about their competence in mathematics as to actual competence.

From the above final path analysis, comparing to perception of individual task statistically group task had slightly more effect to mathematics achievement. Tucker, Herman, Pedersen, Vogel and Reinke (2000) found that both academic preparation of students and positive peer influences would enhance academic success and that praise and encouragement by teachers and parents is needed to facilitate student school work and achievement.

Therefore, there is no significant impact of sex, previous mathematics achievement, individual task, group task and instructional tasks on mathematics achievement.

4.4 Qualitative data interpretations

This part presented for identifying the major factors that affect mathematics instructional tasks. A number of factors may facilitate or hinder the implementation of active learning approach in education system, as discussed in the review of related literature of the study.

The interview informants (school principals and students) indicated that *“teachers are not usually using tasks like class work; home work and group works and they didn’t use Laboratory work and project work totally in teaching mathematics”*. Supporting these ideas, teachers said that they didn’t use laboratory work and project work because of lack of school facilities such as computers, lack of paper for worksheet etc.

One of the principal noted that *“some teachers usually order students to copy note from the text books and consider this as homework.”* Most of them repeatedly mention teachers’ choice of traditional lecture as day to day activity and practice of common place in teaching mathematics.

Many scholars like cole (1994), Aggarwal (2001) and other give emphasis to the importance of instructional task assignments as means to make students agent of their own learning, to bring about meaningful learning by enhancing self-realization instructional tasks are not properly implemented by teachers in teaching mathematics to connect day-to-day school activities to live of students.

The information gathered through interview from teachers and principals revealed that teachers’ lack of interest affected the education system in general and the rate of assigning instructional tasks in particular. One of the principal said that *“because of lack of interest, teachers are not motivating students to do task assignments.”*

As some mathematics teachers (respondent) said most teachers stay as a teacher until they have got job in other profession. That is why they attend learning in other filed of studies other than teaching in Addis Ababa University and other colleges and universities.

Supporting this idea, Bedlue(2008:66) revealed that 81.8% of teachers and 78% of students in Horro-Gudurv wollega zone agreed that lack of teachers' interest affect the application of instructional tasks.

From these study interviewers indicates that teachers seem to over load students with instructional tasks. This is a series problem which contradicts the purpose of instructional tasks. The purpose of instructional tasks is motivating learners to be responsible for their learning. But without a reasonable number of questions and without an optimum amount of time, motivating students to achieve the basic essence of homework is unthinkable.

Mathematics teachers and principals agreed that students' lack of interest negatively affected the implementation of instructional tasks.

According to Bedlue (2008:65) study, in Horro-Gudurv wollega zone 163.6% teachers view students interest to do task assignments is low. In his study 60% of students indicated that they have low interest to do instructional tasks.

Some of the principals noted that *"It is common to see teachers keeping students out of sight as punishment for not doing home works, group work assignments and other mathematical tasks."*

They also noted that *"the rate of students doing instructional tasks is directly related with the teachers' behavior. If the teacher follow up his students work every time and punish careless students, students built motivation for doing assigned tasks, and vice versa."*

In agreement with the above interview Bedlue (2008:65) noted that *"91.7% of students agreed that reason for low students interest is absence of appropriate feedback"* and to his study another reason for low students' interest is *lack of clear instruction on instructional tasks which is supported by 83.3% of the students.*

Principals and teachers reported that *"teachers' lack of frequent on-job training negatively influenced the implementation of instructional tasks."*

Interview informants summarized that *"the major reason why teachers lack interest in applying instructional task assignments is that teachers do not clearly understand the*

contribution of task assignments in mathematics learning.” One of the teacher explained that “some of the teachers assume that instructional task assignments are hindrances to cover portions prescribed in the text books.”

Because of lack of on job training, as one principal said “some of the teachers do not have clear direction about the new education and training policy (1994) in relation to the modern instructional method. Even some teachers are not willing to update themselves by reading books and governments’ strategic plans for minimizing their confusion to implement instructional tasks.”

Some of the teachers’ underlined that “on-job training were not offered in an in-depth manner.” They also said that “usually training was given just for the sack of reporting, not actually to improve the application of instructional tasks.” Supporting this idea one respondent said that “every year training were given at least four times, but more of them were concerned about politics rather than academics.”

CHAPTER FIVE

CONCLUTIONS AND SUGGESTIONS

Effective science education implies the creation of environments for maximizing learning success, which in turn requires information as to the causes of failure. The findings and conclusion of this study provide some useful insights for science educators and other educational leaders regarding the teaching and learning of secondary level mathematics.

5.1 Conclusions

Based on the analysis and discussions of the study the following conclusions are made:-

1. The difference in students' perception of individual takes, group task and instructional tasks between boys and girls are found to be in significant the difference in students' perception of individual tasks, group tasks and instructional tasks among student level of previous mathematics achievement are also found to be insignificant the students. The difference in students' mathematics achievement between boys and girl are found to be insignificant. But the differences in mean value for mathematics achievement between boys and girls is in favor of girls were observed.
2. The difference in students' mathematics achievement between high achiever and average achiever are found to be significant than other achieve levels relations. The students achiever level will not be keep as it is because of different factors.
3. Students had good perception of group task than individual task.
4. Sex and previous mathematics had no statistically direct and indirect effects for individual task group task, instructional tasks and for mathematics achievement. Individual task and group task had no direct effect to mathematics achievement, but they had very small indirect effect to mathematics achievement and had direct effect to instructional task, instructional task had very small direct effect to mathematics achievement.
5. From the study it can be concluded that secondary schools in Nefas-silk Lafto sub city are not using instructional task assignments as intended.

6. Instructional tasks assignment in mathematics teaching and learning process is hampered by multiple factors like students' lack of interest, lack of teachers' interest, lack of training concerning instructional tasks for teachers, teachers' tendency to overuse teacher-centered approach, shortage of adequate time, large class size, in availability of classroom facilities lack of school support and etc.

5.2 Suggestions

Based on the findings of the study and the conclusions drawn, the following recommendations are forwarded so as to see favorable perceptions of students in mathematics instructional tasks in Nefas Silk Lafto Sub-city in general and in sample high school in particular.

- Continuous orientation should be given to teachers about the contributions of instructional tasks in promoting students learning.
- The students should be clearly oriented by school principals, subject teachers and by students' family members about the contributions of instructional tasks in mathematics learning.
- To make teachers to be confident, interested and innovative and to use instructional tasks, they should be provided with the adequate time and the facilities they need including reasonable incentives in accordance with the magnitude of their work.
- For the sake of improving students interest in doing instructional task: text book writers should give due consideration to the number of questions to be included in text books. Teachers should pay attention to the kind of questions to be assigned as homework, group work, project work laboratory work etc and teachers should provide students clear instructions and show techniques of solving sample questions. Finally, teachers should check students' solutions and give chance for other students to discuss with the wrong solutions.
- The newly revised teachers guide for grade 10 mathematics teaching encourage individual and groups tasks in widening the opportunities of student to stand before the class and present their work.

But to this study the contribution of individual task group task and instructional task to mathematics achievement was 0.9% this implies 99.1% mathematics achievement were influenced by variable other than group tasks and individual tasks since there is not guideline or policy in our country that suggests what teachers should do in relation to homework etc researchers and authorities should think whether we have benefited from instructional tasks or not.

- Moving on to group work, I want to suggest that teachers should be clear about the objectives and the methodology of the lesson for which group work has been plotted. They should give clear instructions to students and prepare resources well in advance. If resources are not ready then group work cannot be carried out proficiently. Similarly, if enough resources are not available then students tend to fight over them, causing a disciplinary problem. Therefore, plotting before hand and clear instructions are one of the crucial things that a teacher should keep in mind before conducting group activities.
- Another thing that a teacher has to keep in mind before conducting group work is to properly train the students. Group centered classrooms tend to be noisy. Teachers should make the students aware of the need to maintain a proscribed blast level. Students can be motivated by having a competition within the groups. The group that observes most of the rules would win. Similarly, students can be questioned to lower their voice level while doing discussions. Otherwise the other groups would get a chance to take benefit of their thoughts. This would motivate them to work quietly.
- Group members should also be encouraged to support each other. They should be reminded that if they do not help each other, the quality of their work is going to be affected. For example, If one student has to do the writing then others can help with spellings and thoughts. Teachers should encourage students to equally contribute within groups. To meet this purpose, group members can be assigned different roles. One can be the “encourager”. The encourager could question the others to speak visibly, remind others about turns etc. Another student could be the “reporter”. His/her duty would be to question others about thoughts,

introduction etc. An “administrator” reminds about the time left and makes sure that the group comes to a declaration. Finally, the “recorder” will record the results being dictated by the other members.

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APPENDIX A

QUESTIONNAIRE TO BE FILLED BY STUDENTS

This questionnaire is prepared to collect data that will be used for writing my Master's Thesis as a partial fulfillment of the program of graduate studies in the Addis Ababa University. Thus, you are kindly requested to complete the questionnaire carefully and honestly. Your responses are the only way to reach a reliable research results.

a) General information

1. Name _____
2. Sex: a) Male b) Female
3. Name of the school _____

Main Data

INSTRUCTION: - This questionnaire expresses a feeling or perception towards instructional task assignments (individual task and group task). You are to indicate on a five-point scale the extent of agreement between the attitudes (perception) expressed in each statement and your own personal feelings. Then put a “√” on the appropriate box strongly agree (SA), Agree (A), undecided (UD), disagree (D) and strongly disagree (DA) there is no right or wrong answers. It is simply a measure of your belief regarding the behavior explained in each item. Answer all the items truthfully.

Thank you!

No	Statement (Individual task)	SA	A	UN	D	SD
1	Doing class work alone didn't motivate to work hard on mathematics problems.					
2	My mind goes blank and I am unable to think clearly when doing homework.					
3	I am happier in doing math's class work alone than with other students.					
4	I do not feel worry during presentation of homework.					
5	I didn't manage my time properly while doing individual project work.					
6	I feel a sense of inequality while doing home work.					
7	I would like to spend more time in doing class work.					
8	In mathematics class, I learn more when I work alone.					
9	I avoid solving problems alone because I am not good in doing individual task.					
10	Class work and individual presentation are boring.					
11	I am calm and un afraid when doing home work.					
12	I feel worry that other students might understand individual tasks better than me while presenting the task in class.					
13	In mathematics class, it is important that we learn things by ourselves.					
14	I will receive a good result when I work alone.					
15	Individual task is not an instrument of shaping personality.					

No	Statement (group task)	SA	A	UN	D	SD
1	Doing class work in group didn't motivate to work hard on mathematics problems.					
2	My mind goes blank and I am unable to think clearly while doing group work.					
3	I enjoy the challenges presented by a mathematics group assignment.					
4	I don't feel worry during presentation of group work.					
5	I didn't manage my time properly while doing group project work.					
6	I feel a sense of insecurity while doing group activities.					
7	I would like to spend more time solving problems by discussing with my friends.					
8	In mathematics class, I learn more when I work with my friend.					
9	I avoid solving problems in group because I am not good in group discussion.					
10	Group work is boring.					
11	I am calm and unafraid when doing group work.					
12	I feel worry that other students might understand group task better than me while doing the mathematical tasks in group.					
13	In mathematics class, I like to share my ideas and material with other students.					
14	Working in small groups is better than working alone.					
15	Group task is an instrument of shaping personality of the participants.					

APPENDIX B

MATHEMATICS ACHIEVEMENT TEST FOR GRADE 10 STUDENTS

Name _____ Section _____ Roll. No. _____

Sex _____ Age _____ School _____ Time 90 minutes

Direction: This test booklet contains 30 multiple-choice items. Read each statement carefully. Each item is followed by four possible answers. There is only one best answer for each question. Choose the one that best answers the question and write the on the answer sheet provided.

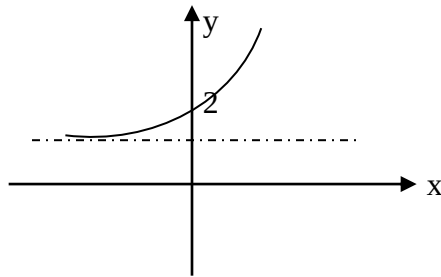
- Which of the following is true about the polynomial function $p(x) = -x^2 + 6x - 12$?
A. $p(x)$ has real zero
B. The minimum value is -3
C. The minimum value is -3
D. The maximum value is -21
- Let $p(x)$ be a polynomial if $p(x + t) = p(x) + p(t)$ for any two real numbers x and t , then which of the following is necessarily the form of $p(x)$?
A. $p(x) = c$ for some constant c
B. $p(x) = x + c$ for some non-zero constant c
C. $p(x) = ax$ for some constant a
D. $p(x) = x^2$
E. None of the above
- If $p(x)$ is a polynomial of degree three with $p(0) = p(1) = p(-1) = 0$ and $p(2) = 6$, then which of the following is **not** true?
A. $p(-x) = -p(x)$
B. $p\left(\frac{1}{x}\right) = \frac{1-x^2}{x^3}, x \neq 0$
C. $p(3) = 4$
D. The graph of p lies below the x -axis for every x b/n 0 and 1
E. None of the above
- Which of the following statements is **not** true?
A. $f(x) = a^x$ decreases for all values of x if $a < 1$
B. If $a < 1$, then the graph of $f(x) = a^x$ approaches the x -axis on the left and increases without limit on the right
C. $f(x) = \log_a x, a > 1$, increase for all values of x in the domain
D. $f(x) = \log_a x, a > 1$
E. All of the above
- If $\log_a^3 = x$ and $\log_a^2 = y$, then which of the following is equal to $\log_a^{3\sqrt{2}}$?
A. $x + y$
B. $\frac{1}{2}(x + y)$
C. $\frac{1}{2}(2x + y)$
D. xy
E. None

6. If m and n are positive integers which of the following is necessary equal to n^{m^2}

- A. $n^m \cdot n^m$ B. $n^m + n^m$ C. $(n^m)^2$ D. $(n^m)^m$ E.

None

7. Which of the following represents the graph of the equation given



- A. $y = 2^x + 1$ B. $y = 2^x - 1$

- C. $y = 2^{x-1}$ D. 2^x

- E. $2^x + 2$

8. The solution set of the equation $x = 6 - x^{1/2}$ is:-

- A. 2 B. -3 or 2 C. $\sqrt{3}$ D. 9 E. None of the

above

9. The solution set of $|2x + 3| = |5x - 3|$ is:-

- A. $\{2\}$ B. $\{0\}$ C. $\{2, 0\}$ D. $\{-2, 0\}$ E. None of the

above

10. A hat and shirt cost birr 48 together. If the cost of the shirt is three times that of the hat, what is the cost of the shirt?

- A. Birr 12 B. Birr 38 C. Birr 6 D. Birr 32 E. none of the

above

11. If $xy = 16$ and $x - y = 6$ then $x^3 - y^3$ is equal to:-

- A. 504 B. 69 C. 52 D. 96 E. None of the

above

12. The solution of the inequality $x^2 + x - 6 < 0$ is:-

A. $(-3, 2)$ B. $\mathbb{R}$ C. $(-\infty, -3) \cup (2, \infty)$ D. $\emptyset$ E. None of the above

13. The mid – point of a line segment is $(2, 5)$. One end point of the segment is $(4, 9)$ the other end point is:-

A. $(3, 7)$ B. $(2, 4)$ C. $(0, 1)$ D. $(6, 14)$ E. None of the above

14. The equation of a line passes through the point $(0, 1)$ and parallel to $2x + y = 0$ is:-

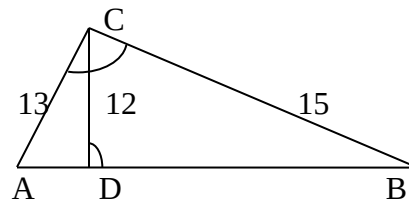
A. $y = -2x$ B. $y = -2x + 1$ C. $y = -1/2 x + 1$
D. $y = 2x - 1$ E. None of the above

15. Which of the following is **not** equal to $\sin \frac{2\pi}{7}$?

A. $-\sin\left(\frac{12}{7}\pi\right)$ B. $\sin\left(\frac{5}{7}\pi\right)$ C. $\sin\left(\frac{16}{7}\pi\right)$ D. $\sin\left(\frac{9}{7}\pi\right)$ E. None of the above

16. If $\triangle ABC$ is as shown in the figure below, then which of the following is **not** true?

- a. $\sin \angle B = \frac{12}{15}$
- b. $\tan (\angle BCD) = \frac{13}{12}$
- c. $\sin (\angle ACD) = \frac{5}{13}$
- d. $\tan (\angle A) = \frac{12}{5}$
- e. None of the above



17. Which of the following is the solution set of $2 \cos^2 \theta - \sin \theta = 1$ for $0^\circ \leq \theta \leq 360^\circ$?

A. $\{30, 60, 270\}$ B. $\{150, 270, 120\}$ C. $\{30, 150, 270\}$
D. $\{60, 120^\circ, 150^\circ\}$ E. none of the above

18. Which of the following is negative?

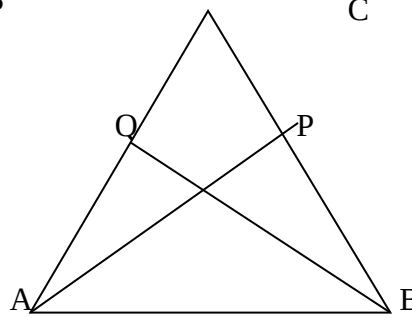
- A. $\cos (-89^0)$ B. $\sin (-89^0)$ C. $\tan (-120^0)$ D. $\sin (120^0)$ E. None

19. If the sum of two angles of a triangle is 140^0 and their difference is 20^0 , then triangle is:-

- A. an obtuse B. an isosceles C. an equilateral D. a right E. none of the above

20. If in the figure, $\triangle ABC$ is such that $\angle BAC \cong \angle ABC$ and $\angle BAP \cong \angle ABQ$, then which of the following is **not** true?

- a. $\triangle ABP \cong \triangle BAQ$
b. $\triangle ADQ \cong \triangle BDP$
c. $\triangle APC \cong \triangle BQC$
d. $\triangle ABD \cong \triangle PQC$
e. None of the above



21. Which of the following ordered pairs does not belong to the function $y = \cos t$?

- A. $(-\pi, -1)$ B. $(-\pi/2, 0)$ C. $(6\pi, -1)$ D. $(7/2\pi, -1)$
E. $(0, 0)$

22. Which of the following pairs of angles are not co-terminal angles:-

- A. 1420 and -20^0 B. -155 and 1925^0 C. 300 and 1020^0
D. 2140^0 and -1460 E. None of the above

23. If $\csc \theta = 3$ and $\sec \theta = \frac{3\sqrt{2}}{4}$, then which of the following statements is not true?

- A. $\sin \theta = \frac{1}{3}$ B. $\tan \theta = \frac{\sqrt{2}}{4}$ C. $\cos \theta = \frac{2\sqrt{2}}{3}$

D. $\cot \theta = \frac{2\sqrt{2}}{3}$

E. None of the above

24. If $\cos \theta = \frac{5}{6}$ and $0 < \theta < \frac{\pi}{2}$, then $\csc^2 \theta$ is equal to:-

A. $\frac{36}{25}$

B. $\frac{36}{11}$

C. $\frac{11}{36}$

D. $\frac{\sqrt{11}}{6}$

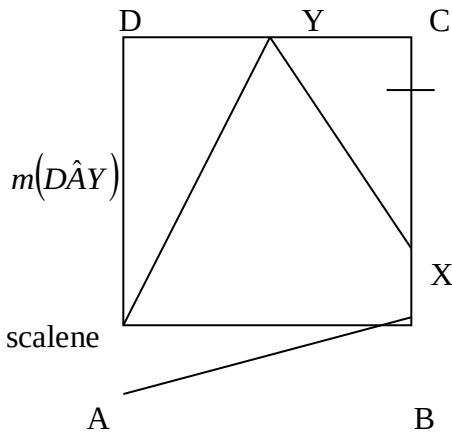
E. None of the

above

25.

In the figure given ABCD is a square and $\triangle AXY$

is an equilateral Triangle, then which of the following statement is true?



A. $m(\hat{D\hat{Y}A}) = 70^\circ$

B.

C. $m(\hat{Y\hat{X}C}) = m(\hat{A\hat{X}B})$

D. $\triangle YCX$ is a

E. None of the above

26. Which of the following angle is quadrantal angle?

A. 120°

B. 420°

C. 450°

D. 390°

E. None of the

above

27. The zeros of a polynomial function, $p(x) = x^2 - \frac{1}{2}$ is equal to:

A. $-\sqrt{2}$ and $\sqrt{2}$

B. $\frac{\sqrt{2}}{2}$ And $\frac{\sqrt{2}}{2}$

C. -2 and 2

D. $-\frac{1}{2}$ and $\frac{1}{2}$

E. none of

the above

28. If 2000 Birr is invested at 4% interest, compounded every year for 2 years, what is amount realized at the end of 2 years?

A. 2080 Birr B. 2332.80 Birr C. 2246.40 Birr D. 2160Birr E. none of the above

29. The range of cosine function is:-

A. $\mathbb{R}$ B. $(1, \infty)$ C. $[-1, 1]$ D. $(-\infty, -1)$ E. $\mathbb{R} \setminus (-1, 1)$

30. Suppose $\triangle ABC$ is an isosceles right angled triangle and its hypotenuse is 6cm, then the area of the $\triangle ABC$ is-----square .cm.

A. 18 B. 36 C. $6\sqrt{3}$ D. 9 E. none of the above

APPENDIX C

ITEM SPECIFICATION FOR GRADE 10 MATHEMATICS EXAMINATION

Major and specific content areas		Behavioral out			Total
		Knowled ge	Comprehen sion	Applicati on	
1	Theorems on polynomials				
1.1	Graphs of a polynomial function		2	1	3
1.2	Fundamentals for working with exponents and logarithms			1	1
2	Exponential and logarithmic functions				
2.1	Fundamentals for working with exponents and logarithms	1	1	1	3
2.2	Graphs of exponential and logarithmic function	1	1	-	2
2.3	Applications of exponential and log-functions	1	-	1	2
3	Solving inequalities				
3.1	Inequalities involving absolute value	2	1	-	3
3.2	Systems of linear inequalities in two variables	1	-	1	2
3.3	Quadratic inequalities	-	1	1	2
4	Coordinate Geometry				
4.1	Distance b/n two points				
4.2	Division of line segment	1	1	-	2
4.3	Equation of line	-	1	1	2
4.4	Parallel and perpendicular lines				
5	Trigonometric Functions				
5.1	Basic trigonometric functions	1	1	-	2
5.2	Reciprocal function of the basic trig function	1	-	-	1
5.3	Simple trigonometric identities	1	-	1	2
5.4	Real life application problems		1		1
6	Plane geometry				
6.1	Theorems on triangles	-	1	1	2
Total					30

APPENDIX D

INTERVIEW QUESTIONS FOR GRADE 10 STUDENTS

1. What did you think about instructional tasks like individual work and group work?
2. Which types of task are used mostly in your school?
3. Do you like doing mathematics alone or in group? Why?
4. Did you benefited from doing mathematics alone or doing in group?
5. Did teachers support you at the time of doing mathematics instructional tasks?
6. What are the main problems when you are doing mathematics instructional tasks?
And what are the solutions?

APPENDIX E

INTERVIEW QUESTIONS FOR GRADE 10 MATHEMATICS TEACHERS

The purpose of this survey is to gather information concerning the perception of instructional task and achievement of students in mathematics and the factors that affect instructional tasks in mathematics teaching and learning in Nefas Silk-Lafto sub city Addis Ababa.

A) General Information

1. Name of the school _____
2. Sex _____
3. Age of the teacher _____
4. Qualification: _____
5. Teaching experiences _____

B) Interview questions

7. What did you think about instructional tasks like individual work and group work?
8. What did you think about the perception of students to instructional tasks?
9. What did you think about the achievement of students in mathematics?
10. Can you finish the portion of mathematics?
11. What did you think about the time allotment for mathematics?
12. Did you give more individual work and group work? Why?
13. Did you give feedback for each individual work and group work?
14. Did you use teaching aids? If not, why?
15. What are the main problems when you are teaching mathematics? And what are the solutions?
16. Have you discussed with teachers, authorities, students or stakeholders about the problems that you faced when you teach mathematics.

APPENDIX F

INTERVIEW QUESTIONS FOR SCHOOL PRINCIPALS

A) General information

1. Age _____
2. Sex _____
3. Qualification _____
4. Working experiences as a principal _____
5. Total working experiences _____

B) Interview questions

1. Did you get any on job training about instructional task assignments like:
 - Class works
 - Home works
 - Project works
 - Laboratory works
 - Group works and their applications
2. If yes, is there any strategy for the application of instructional task assignments in the school?
3. Have you conducted any discussion on the issue of the application of instructional task assignments with teaching staff?
 - If yes, what were the results obtained?
 - If no, what were the reasons?
4. What do you think are the major factors that may influence the perception of students towards the application of instructional task assignments at school?
5. If any difficulties are encountered, please would you suggest some of the possible solutions?

APPENDIX G

STUDENTS PREVIOUS MATHEMATICS ACHIEVEMENT RESULT

Student Number	School	sex	p.m. achievement out of 100
1.	Fana secondary school	F	61
2.	«	M	50
3.	«	F	64
4.	«	F	54
5.	«	F	60
6.	«	M	55
7.	«	F	54
8.	«	F	8
9.	««	F	74
10.	«	F	54
11.	«	F	65
12.	«	F	53
13.	«	F	62
14.	«	F	63
15.	«	M	60
16.	«	M	58
17.	«	M	51
18.	«	F	60
19.	«	F	57
20.	«	F	51
21.	«	F	50
22.	«	M	51
23.	«	F	58
24.	«	M	70
25.	«	M	50
26.	«	M	50
27.	«	F	80
28.	«	F	54
29.	«	F	57
30.	«	M	58
31.	«	M	63
32.	««	F	58
33.	«	M	95

34.	«	M	38
35.	«	M	54
36.	«	M	62
37.	«	F	50
38.	«	M	51
39.	«	M	47
40.	«	F	32
41.	«	M	45
42.	«	F	55
43.	«	F	55
44.	«	F	35
45.	«	M	44
46.	«	F	72
47.	«	M	35
48.	«	F	54
49.	«	F	23
50.	«	M	45
51.	«	M	35
52.	«	M	63
53.	«	F	41
54.	«	F	45
55.	Ginbot-20	M	62
56.	«	M	52
57.	«	M	68
58.	«	F	70
59.	«	F	55
60.	«	F	61
61.	«	F	56
62.	«	F	50
63.	«	F	72
64.	«	F	42
65.	«	F	71
66.	«	M	76
67.	«	M	64
68.	«	M	46
69.	«	M	88
70.	«	M	49
71.	«	F	56
72.	«	F	51
73.	«	M	71
74.	«	M	43
75.	«	F	54
76.	««	F	58
77.	«	F	47
78.	«	F	60
79.	«	M	48

80.	«	M	38
81.	«	F	36
82.	«	F	45
83.	«	M	56
84.	«	F	70
85.	«	M	60
86.	«	M	40
87.	«	F	74
88.	«	F	43
89.	«	F	49
90.	«	M	56
91.	«	M	44
92.	«	F	54
93.	«	F	50
94.	«	F	88
95.	«	F	54
96.	«	M	41
97.	«	M	49
98.	«	F	34
99.	«	M	80
100.	«	F	47
101.	«	M	50
102.	«	F	42
103.	«	F	70
104.	«	M	63
105.	«	F	63
106.	«	F	45
107.	«	M	65
108.	«	M	49
109.	«	M	33
110.	«	F	22
111.	«	M	45
112.	«	F	55
113.	«	M	47
114.	««	M	58
115.	««	M	81
116.	«	M	83
117.	Lafto	F	66
118.	«	F	44
119.	Lafto	M	98
120.	«	M	50
121.	«	M	85
122.	«	F	57
123.	«	F	50
124.	«	F	46
125.	«	F	57

126.	«	F	58
127.	«	F	47
128.	«	M	63
129.	«	F	63
130.	«	F	84
131.	«	F	42
132.	«	F	47
133.	««	F	66
134.	«	M	48
135.	«	M	57
136.	«	M	72
137.	«	F	33
138.	«	M	40
139.	«	M	34
140.	«	M	43
141.	«	M	44
142.	«	F	38
143.	«	F	42
144.	«	F	56
145.	«	F	46
146.	«	F	42
147.	«	F	28
148.	«	F	44
149.	«	F	42
150.	«	F	49
151.	«	F	40
152.	«	F	55
153.	«	F	51
154.	«	F	35
155.	«	F	41
156.	«	F	42
157.	«	F	34
158.	«	F	64
159.	««	M	56
160.	«	F	55
161.	«	M	48
162.	«	M	85
163.	«	M	46
164.	«	F	74
165.	«	F	25
166.	«	F	63
167.	«	M	41
168.	«	M	35
169.	«	F	62
170.	«	M	49
171.	«	M	43

172.	«	M	83
173.	«	F	59
174.	«	F	45
175.	«	F	58
176.	«	F	55
177.	«	M	48
178.	«	M	85
179.	«	M	46
180.	«	F	74
181.	«	F	25
182.	«	F	63
183.	«	M	41
184.	«	M	35
185.	«	F	62
186.	«	M	49
187.	«	M	43
188.	«	M	83
189.	«	F	59
190.	«	F	45
191.	«	F	58
192.	«	M	50
193.	«	F	60
194.	«	M	49
195.	«	F	41
196.	«	F	47
197.	«	M	58
198.	«	M	46
199.	«	M	48
200.	«	F	55

DECLARATION

I, the undersigned, declare that this thesis is my work and that all sources of material used for this thesis have been duly acknowledged.

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