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STUDIES**

**STUDENTS' INTERACTION IN MATHEMATICS CLASSROOM: THE CASE  
OF SECONDARY SCHOOLS OF BORENA ZONE, OROMIA REGION**

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## ***List of Abbreviations***

HERQA Higher Education Relevance of Quality Agency

NRC National Research Council

## ***Abstract***

*The purpose of this study was to investigate students' interaction in mathematics classroom, the factors which influence students' classroom interaction. Furthermore, it is intended to look for possible means of solving students' classroom interaction problems. Qualitative case study was employed to carryout this study. For this study three secondary schools were selected purposely. Then, four mathematics teachers and eight grade ten students participated in the interview. Four purposely selected classrooms were observed five times and fourteen students were involved in focused group discussion in three sections. Expecting them to give rich information to the researcher, teachers and students were selected purposively. Three instruments namely unstructured classroom observation, unstructured interview and focused group discussion have been employed to collect the necessarily data from the three purposely selected government schools of Borena zone- namely Abaya, Tore and Gerba secondary schools. Qualitative technique was used to analyze the data. The result of the study revealed that, classroom interactive activities were not implemented properly due to teachers' domination, teachers' lack of awareness to interactive activities, teachers' unfair treatment, lack of confidence of students and speaking experience in front of people, students' earlier experience and improper seating arrangement. Based on these findings and conclusion certain recommendations have been made to minimize the problem and to increase the interactive ability of students in order to develop learners' participation in mathematics classroom.*

# CHAPTER ONE

## Introduction

### 1.1 Background of the Study

According to the 1994 New Ethiopian Education and Training policy, the main aim of education is to provide students to solve problems and to use the information that acquired from their environment and other sources to make a better life for themselves, their families and their communities. To fulfill this aim, the students must participate actively rather than passively listening and watching what is going on in the classroom.

Moreover, to get the expected result, an appropriate curriculum that can realize quality of education must be designed and implemented properly at all levels of education and in all regions of the country. The instructional methodology must provide methods that encourage active participation of the learners.

Since learning by its nature is an interactive process, different researchers indicated that students should involve in teaching learning process. According to Borrich (1988), learning that leads active involvement of students defined as anything that students do in classroom rather than merely and passively listening to an instructors lecture. This includes everything from listening practices, which help students to absorb what they hear, to short writing exercise in which students react to lecture materials, to complex group exercise on which students apply course materials to near life situation and to new problems.

Extending this Bonewell and Eison (1991), Jencks and Peck (1968) suggested that, students must do more than just listen. They must read, write, discuss or be engage in solving problems. From the point of view of these authors the strategies that promote active involvement of learning is an instructional

activity involving students in doing things and thinking about what they are going.

From the above arguments, we can realize that education must be divorced from traditional lecture system and related with an active role of students as explorers and constructors of their own learning. Because, the society expect more from education to provide a citizen that are well equipped with the skill and knowledge to solve its problems and bring about a difference in their life and the community.

To realize this Ministry of Education adopted the strategy of making science and mathematics subjects interactive and trained some teachers by selecting from all region in May 2009. The reason why MOE give more emphasis for such subjects is that they are frequently suggested to be a suitable candidate for interactive method and easily understood through interactive learning (Mayler et.al, 2003 and Bean, 2009).

Brown et.al (1991), defines interactive learning as learning in which students and their teacher to share ideas and take turns leading discussion. The research indicates that interactive learning challenges students to develop their own capabilities and provide learners with situations that push the boundaries of their abilities and actively engage them in task (Barker and tucker, 1990:175). They explain this idea saying:

*It does not mean what the teacher offers the leaner a choice of four answers, three of which are wrong and then show the consequence of that choice. But, it means that what each leaner receive is a reaction to what they have themselves put into the system.*

Depending on the above arguments we can infer that, in interactive classroom students should be encouraged to articulate how they learn, what the problems are they working on, what question and prior ideas they have, what their plans are to solve the problem. To lead students to this strategy, it needs

the interaction of sensitive teachers to interact and challenge students thinking exposing them to new idea (Bruce, 2008).

However, different teachers may perceive the importance of classroom interaction differently. What teachers do in a classroom has an effect on their relation with the learners. Clark and Stray (1967) as cited in Sisay (1999) indicated that personality of the teacher does much to create the atmosphere of the class. Teachers who lead pupils the wrong way, who didn't like adolescents, who is in considerate, unhappy and luck sense of humor are likely to have disturbance in their classes. A study by Brophy et.al (1987) also indicates that, teacher's affective reactions such as attachment, concern indifference, reflection, etc influence their behavior toward learners. In general, researchers suggest that the interpersonal relationship between the teacher and the students, which they will sense in the exchanges, may either kill their interest for learning or whet their appetite for more. This is to say that if the interpersonal relationship between the teacher and student is friendly, this increase their desire to enjoy more in classroom.

Therefore, the task of the teacher should be arranging an interactive approach to develop classroom that help students to make sense and reflect on their experiences, evaluate their work, set future learning goals and enrich their learning. Taking the above discussion points in consideration, I am initiated to investigate students' classroom interaction in mathematics classes, awareness and attitude of teachers and students in classroom interaction, factors influencing the classroom interaction and other impacts of classroom interaction in the teaching learning process.

## **1.2 Statement of the Problem**

My teaching experience in junior and secondary schools, and different studies done on similar issue by different researchers such as Mccual (1994), Yeshimebrat (1998) and Andualem (2006) have convinced me that secondary

school students' classroom interaction of mathematics class has still problem that needs to be studied further.

In Ethiopia, the image of mathematics in society is taken as difficult subject and should not be enjoyed. There is also perceived to be disgrace not being able to do even simple mathematics. Students also believe that they will find it as a difficult subject and will not enjoy it. They do not see mathematics as the subject that is associated with their every day lives and that can be challenging and fun but only a dry abstract rote learning activity (MOE, 2009).

However, now days, MOE give due attention for science and mathematics subjects and design the strategies that invite students to involve actively in the classes of these subjects. The learning environment that provides an opportunity for students' active involvement should be open, dynamic, trusting and promoting the natural desire and curiosity to learn (Kithaka et.al. 2009). In this kind of environment, students collaborate on meaningful and authentic problems, which serve to further their understanding of the subject matter and them selves. This type of learning involves the whole person; their feelings, thinking, social skill and intuition. Therefore, such type of learning resulted in empowering students to be a lifelong learner, to embrace their own abilities and accept the view of others. To achieve this MOE prepared different workshops and seminars that help the teachers to create conducive atmosphere in the classroom and adopt suitable method of teaching so as to make the learners interactive in the class room.

The workshop that was conducted on May, 2009 by ICDR and the participation of Ethiopian educators on the seminar that was conducted in Kenya on October, 2009 indicate that MOE gives more emphasis to improve students' participation in mathematics classes. The main goal of these workshops was to foster the implementation of student- centered, minds-on, hands-on learning as much as possible in science and mathematics subject (Kithaka, et.al, 2009 and Yosef, 2009).

Having the above point in mind, since mathematics is a subject in which interactive learning can be utilized, there should be a shift in focus of educational research from learning outcome to learning process and from an individual students learning to the learning process in the social situation in the classroom (Keiran, 1994 in Solomon, 2006).

This is to say that the understanding of concept should be given priority over learning by rote. Therefore, according to the MOE, emphasis should be given to process learning rather than product learning. Because, process learning is a way of action, a way of acquiring knowledge, a way of thinking about things and having order and direction where as product learning is merely a method of learning to achieve result. To achieve this, teaching of mathematics must be improved in order to insure that all students are interactive in the classroom. This will keep students motivated to work hard, help them to remember facts and mathematics process and bring interests to their mathematics lesson.

NRC (2000) argued that, to improve mathematics education for all students we need to expand teaching practice that engage and motivate students as they struggle with their own learning. This is to indicate that all students should be involved actively in their learning to gain a practical knowledge in mathematics. NRC further elaborated that saying,

*Education research offers compelling evidence that students learn mathematics well only when they construct their own mathematical understanding. To understand what they learn, they must enact for themselves verbs that permeate the mathematics curriculum 'examine', 'represent', 'transform', 'solve' 'apply' 'prove' and 'communicate'. This happens most readily when students work in-group, engage in discussion, make presentation, and in other ways take charge of their own learning.*

(NRC, 2000, 58-59).

This can be realized if teachers commit themselves to their teaching profession and to their learners. Teachers who are excited about mathematics and can provide the mental imagery necessary for students to acquire understanding and confidence in their own thinking and who can also ask challenging questions that create both excitement and opportunity for children to stretch and exercise their minds (Jencks and Peck, 1968).

Literature pertaining to interactive learning in mathematics classes is limited with reference to the Ethiopian context. However, three related studies are significant in this respect. The first is Mccaul's (1994), which treats teacher-pupil interaction in mathematics class at grade nine levels. His study found that mathematics teachers have not awareness about classroom information and played the dominant role in classroom discussion.

Another study by Yeshimebrat (1998) focused on gender differentiation reflection in secondary school teachers' behavior during classroom interaction in physics classes. She discovered that girls were likely to be left out of the opportunity of classroom interaction than boys and suggested that teachers should get gender sensitive seminars and workshops in relation to their teaching in order to bridge this gap.

Finally, a recent study by Andualem (2006) examined social interaction in mathematics classroom in City Secondary School in Addis Ababa. His finding indicated that social norm of the classroom is a significant factor that affects the mathematics classroom interaction in City Secondary School.

The difference between the previous studies and the present study lies in time, setting and subjects. Most of the studies stated above were conducted in Addis Ababa secondary schools respectively 16, 12 and 4 years ago while this study focus on a different and new setting and subjects of Borena Zone, Oromia Region in three selected government secondary schools with a focus on grade ten students.

As I discussed above these three studies tried to identify some factors like teachers dominance, social norm of classroom and teachers treatment of different sexes differently are factors that affect students classroom interaction respectively according to Mccaul (1994), Andualem (2006) and Yeshimebrat (1998). The present study takes these three studies as the starting point; and I tried explor further factors that inhibit students from interacting actively in mathematics classes at a selected grade level with the following objectives.

### **1.3. Objective of the Study**

This study primarily aims:

- to investigate students' classroom interaction in mathematics classes in secondary schools of Borena Zone;
- to explore the factors which influence students' classroom interaction in mathematics classes;
- to look for means of solving students' classroom interaction problem in order to increase their participation in mathematics class to facilitate their active involvement.

This is considered possible to achieve through answering the following basic question.

1. How is students' classroom interaction in mathematics classes?
  - 1.1. What proportion of the classroom time is shared between teachers and students activities?
  - 1.2. How is teachers' behavior in treating students in classroom interaction?
  - 1.3. To what extent teachers are committed and interested to facilitate interactive activity?
  - 1.4. Are teachers aware about the contribution of classroom social interaction for the teaching learning process?
2. Do students actively participate in their mathematics classes while learning mathematics?

3. Are there cooperative working culture and practices in mathematics?
4. What are the factors influencing students classroom interaction, participation and cooperation in mathematics classes?

### **1.4 Significance of the Study**

It is believed that students should be active classroom participants and utilize information from their environment and other sources to contribute for themselves, their families and their community. However, the situations might be difficult with regard to the implementation of interactive classroom activities. Therefore, in investigating the students' classroom interaction, the finding may help;

- the teachers in promoting classroom interaction of students in mathematics classes.
- to encourage educational experts, supervisors principals and teachers to be involved in strengthening of interactive learning in mathematics classes.
- other researchers and policy designers to use it as a reference or as a source of information for further study and materials development.

### **1.5 Scope of the Study**

To carryout any research work it is necessary to delimit the scope of the study to manageable size. Thus, geographically, the study was delimited to Borena Zone of Oromia regional state. There are eleven secondary schools in the zone, from these six of them transmit teaching learning process using plasma Television and the rest five are non plasma schools. Therefore, to investigate students' classroom interaction and to identify the factors that influence students' classroom interaction, the study was delimited to grade ten students and mathematics teachers of three secondary schools that did not use plasmid television to transmit the instruction. Because, in qualitative case study the researcher is the most required person for data collection and it needs his presence for a long period of time at the research site. Therefore, to make the

manageable and to complete the research on time the study included only three secondary schools.

Since this is a case study that aimed at investigating students' classroom interaction, it involved only grade ten students and their mathematics teachers. Furthermore, the study included teachers and students classroom behavior, teaching method, , teachers' training and classroom organization. But it did not include analysis of textbooks and curriculum materials.

### **1.6 Limitation of the Study**

It would have been better to extend the numbers of schools and subjects of the study. Including large population size in the study could help to get more relevant and broader information. However, because of the constraints of time and resources, the researcher is not able to conduct his research in many secondary schools so that it could be adequately representative for borena zone.

## **CHAPTER TWO**

### **Review of Related Literature**

#### **2.1. Defining Classroom Interaction**

Classroom interaction is the key element in the teaching learning process. The more opportunities students have for social interaction with their peers and teachers, the more viewpoints they will hear. Different scholars such as Bruce(2009) and Ernest(1996) recommended interactive learning approach for all subjects, in particular for science subjects. This is because the students perform classroom activities with personal initiative both mutually and particularly.

Based on its practice and ways of implementation classroom interaction is defined by different scholars in different contexts, but the central idea of classroom interaction remains the same. Richard and Platt (1992) define classroom interaction as the pattern of verbal and non – verbal communication and the type of social relation ship that occurs with in classroom. They also define classroom interaction in relation to interaction analysis by saying that, it is any of several procedures for measuring and describing the behavior of students and teachers in classroom.

Brown (1994) define interaction as the collaborative exchange of thoughts, feelings or ideas between two or more people resulting in a reciprocal effort on each other. This means interactive classroom enhances students' individual participation with their partners or teachers. It encourages them to make sense of using learning in social – like contexts in cooperative learning, collaborative learning or group discussion.

Similarly, Martin (1997) defines interaction as the process referring to face – to – face action. It can be either verbal, challenged through written or spoken words, or non – verbal, challenged through touch, proximity, and eye – contact, facial expressions, gesturing etc. In such class, that practice

interaction students communicate in small groups in large groups, individual conversations with each other or with teacher.

In line with the above perspective, Stevick (1980) cited in Allwright (1981:157) argues "...we may expect learning to be more effective the more deeply it involves the learners". His view stresses the idea of helping learners to learn through interaction. This can be done by bringing activities that get learners more deeply involved. In deciding the activities that are assumed to be interactive, the class members should be taken as a major element than the pedagogic ideas developed to generate involvement in the classroom (Brown, 1994)

Classroom interaction, therefore, is more important and it should be promoted in teaching learning process because it provides more opportunities for students to practice classroom activities mutually among them selves (in pair or in small group) and with their teacher. It also fosters students' knowledge of and enthusiasm for the subject and stimulates engagement and participation in learning process. This is to say that it encourages learning in depth and encourage students to reflect on and take responsibility for their own learning and to develop their academic self-confidence (HERQA, 2006)

Rivers (1987:4) puts the centrality of classroom interaction in the following way:

*Interaction involves not just expression of ones own idea but comprehension of those of others. One listens to others, one responds (directly or indirectly), others listen and respond. The participants work out interaction, which is always understood in a context, physical or experimental with non – verbal cues adding aspects of meaning beyond the verbal. All of these factors should be presented as a student learns to communicate, listen to others and talking with others.*

Furthermore, classroom interaction creates learning opportunities for learners in interactive situation. Different type of pair and group activities learners have to do and the fact that teachers have to be more of facilitators to students do much of the productive activities creates different environment (Elizabeth, 2003). Teachers are responsible to create or stimulate student's creation of the types of situations in which interaction mutually blossoms and in which students can use actual communication what they have been learning in more formal way (Rivers, 1987).

## **2.2. Roles of a Teacher in Interactive Mathematics**

### **Classroom**

In many areas of instruction, the teacher is the key person in the learning situation, providing information, explaining concepts or skills, and giving examples. Even if the students interact with the teacher and with each other, it is the teacher, who directs the instruction, leads lessons, prompt responses and pace the class. Regarding this Yoseph (2009) noted that, a teacher works to take on more creative, spontaneous, and debate. This indicates in interactive classroom, the teacher is responsible to create opportunities that facilitate students learning.

In short, Direbsa (2001) noted that, the role of the teacher in interactive classroom will become guides and mentors helping student access, interpret,

organize and transfer knowledge to solve authentic problems, while students gain expertise not only in the content area but also in learning.

The role of the teacher, on the other hand described by Leu (2002: 4) is much more important in interactive learning. As Leu further elaborated:

*The teachers have greater responsibilities and their role is somewhat different. It is the teacher's role, not only to give information, but also organize the activities through which students will gather or use information. Guide the students through these activities, help them find additional sources of information, make sure they are rely thinking and analyzing, check their progress regularly to make sure all students are learning and give remedial help when students do not understand or are falling behind.*

Wright (2000) and Nunan (1988) have tried to show that the role of communicative teacher, who attempts to apply an interactive learning process is surely different from a teacher may be seen as on authorized body, dominator initiator, corrector, judger, leader. In contrast, in interactive classroom, the major roles expected to be played by the teacher are facilitator, friend, informant, social worker, and manger and so on.

Based one different educationalist view it is true to say that the role of teachers is highly important to make mathematics learning interactive. On his study Martin (1997) argued that, mathematics teachers must encourage children to construct their own conceptualizations, and provide ownership of knowledge and thinking to the children. This helps the children to be self-empowered, to develop confidence in their thinking abilities and to take ownership of their knowledge and thinking.

The role of teachers in mathematical communication addressed by Davidson (1990: 5) is:

*Teachers foster communication in mathematics by asking questions or posing problem situations that actively engaged students in small group work, large group discussion, and presentation of individual and group report – both written and oral-provide on environment which students can practice and refine their growing ability to communicate mathematical thought process and strategies.*

When organizing mathematics instruction that is responsive to how children learn mathematics that focuses on developing mathematical thinking in all the students, teachers need to examine both teaching and learning aspects of the classroom. According to Davidson (1990), teacher need to plan instruction that is responsible to the maturity level of the students provides the experiences with physical materials and promotes social interaction in the classroom.

Therefore, Brophy and Good (1987) indicate that, teachers must actively instruct their students in large and small group-demonstrating skills, explaining concepts, conducting participatory and practice activities, exploring assignments, and reviewing when necessary. According to those authors, teachers not only allocate most of their time to academic activities, but also organize their classroom as effective learning environment and use group management approach that maximize student engagement in those activities.

### **2.3. The Role of Students in Mathematics Classroom**

A teacher cannot take a child into learning or he/she cannot tell a child to understand. Learning is an internal process that happens in individual ways and on individual time schedules. Therefore, similarly Martin (1997) indicates that if children are to learn and retain anything, they must own and value what they do, not what teachers do. Teachers' job is to lead them to their own sound thinking.

Learning is enhanced if the students are given the opportunity to use their own words to restate material they learned, to generate their own examples, to recognize it in different contexts and formats, to make connection between what they just learned and other facts or ideas previously learned to apply different ways, etc (Yosef, 2009). This is to say that, the students should be actively engaged with the material during class time and this engagement is best accomplished via student-student interaction.

Studies indicate that, classroom activities must encourage students to express their approaches both orally and in writing. Students must engage mathematics as a human activity; they must learn to work cooperatively in small groups to solve problems (Davidson, 1990). Extending his idea Davidson said, "Students mathematics learning is supported when they have opportunities to describe their own ideas, hear others, explain their thoughts, speculate, question, and explore various approaches". This means all students should engage in a great deal of inventions as they learn mathematics they impose their own interpretation on what is presented to create a theory that makes sense to them (NRC, 2000).

Supporting this Bruce (2007) argued that, learning mathematics is viewed as a social endeavor. According to this author, mathematics classroom functions as a community where thinking, talking, agreeing and disagreeing are encouraged. This means students must be given opportunities to talk about mathematics, and explain and discuss their results. They should feel confident in using their own language to discuss with their teacher and with their peers how do they do their mathematics activities and any problem they have (MOE, 2009).

Similarly, Jencks and Peck (1968) argued that, every learners needs to know that he construct important parts of mathematics for himself. This is because knowledge is individually constructed through interactions with the environment and others (cognitive) and is co-constructed through interactions with others (social) (Yosef, 2009).

From the above arguments, it is important for children's to learn the process skills than to learn facts. This is to say that, it is important that they to learn to do mathematics than to learn about mathematics (Martin, 1997). This can be achieved by providing for students more opportunities to interact with each other and with teachers. This is because mathematics solution seeks to establish classroom environment in which working in cooperative groups is part of the basic culture of the classroom learning process. Such classrooms maximize the active participation of each student and reduce the isolation of individuals.

Classroom participation as defined by Davis (1993) is a discussion which typically involves a lengthy conversation as well as a short exchange of idea between teachers and students or with in the whole class. It can resulted in fostering high level of energy and enthusiasm in classroom learning environment. This students' enthusiasm, involvement and willingness to participate affect the quality of class discussion as an opportunity for learning. To achieve this teachers should challenge to engage all students, keep them talking to each other about the same topic, and help them develop insights in to the material (Davis, 1993).

Similarly D Port (1997) argued that, high level of classroom participation can be achieved by creating a suitable atmosphere that would allow students to express themselves freely and make them eager to communicate.

One way of creating such atmosphere is designing classroom question in which learners can be obliged to display knowledge already known by them or they will be made to provide unknown information by expressing attitudes, ideas, feelings etc. (Mehan, 1979 in Seliger and Long, 1983). In addition to this Sato and Long (1983) cited in Seliger and Long (1983) stated that questions can be means to facilitate and sustain participation.

The above argument signifies that questions in mathematics classes help to motivate learners to take part in classroom activities. This however, achieved if the type of questions used in classroom can be effective in promoting students

active participation. Effective questions are those that are designed to ask for information and in which questions and answer activities should have a communication purpose and an information gap to be filled (Talebinezhu, 1999). In line with this, Matiru, et. al (1995) emphasizes the advantage of using broad, though –provoking and open questions over narrow, recall types questions as the later can have adverse effect on the interest of learners to participate in classroom.

Another means of maximizing participation is letting students to work in-group so as to get them talk to one another. This is because; group work or pair work is beneficial in encouraging learners to participate in discussion since group work can give more freedom than activities done by the whole class. It can also useful for developing personal skills like assertiveness, working with others and various communication skills (Matiru, et,al, 1995). However, the success of learners' participation in-group work is crucially depending on the nature and organization of group work (Richard and Rodger, 2001). Because the organized group work increases the amount of students class participation. If care is not taken while forming groups, most members may unable to contribute while one or few totally dominate the group. This could be a serious problem, which may secondary school teachers face. Learners' reluctance or unwillingness to participation in-group activity is found to be serious problem in mathematics classroom.

To overcome such problem, many scholars suggest organizing cooperative learning group as a remedy solution. For instance, Johnson and Johnson (1994), explain that in cooperative learning students work together to maximize their classroom participation in-group work.

Students' learning is enhanced when they get opportunities to describe their own ideas, to listen others when they explain their thoughts, raise questions and explores various approaches. To provide for this, learning together in small groups or large groups gives students more opportunities to interact with their peers as well as their teachers. Not only do students have the

chance to speak more often, but also they may be more comfortable taking the risk of trying out their thinking during problem solving situations in the setting of small group (Davidson 1990).

In his study Davidson, explain that mathematics solution seeks to establish classroom environments in which working in cooperative groups in part of the basic culture of the classroom learning process. Such classrooms maximize the active interaction of each student and reduce the isolation of individuals. Therefore, having students work cooperatively has important implications for the success of mathematics instruction. Because cooperative learning is a methodology that employs a variety of learning activities to improve students understanding of a subject by using a structured approach that involves a series of steps, requiring students to create, analyze and apply concepts (Kagon, 1990).

Good and Brophy (1987:438) state the following indicating the contribution of cooperative learning to foster students' classroom interaction.

*Cooperative learning arrangements promote friendship choices and prosocial patterns of interaction among students who differ in achievement, sex, race or ethnicity, and they promote the acceptance of mainstreamed handicapped students by their non-handicapped classmates. cooperative methods also frequently have positive effect on affective out comes such as self-stem, academic self confidence, liking for the class, liking and feeling liked by classmates, and various measures of empathy and social cooperation.*

Combining teamwork and individual accountability help students to work toward acquiring both knowledge and social skills. Since it is a teaching strategy that allows students to work together, it helps them to clarify concepts and ideas through discussion and debate (Johnson, Johnson and Holubec, 1986). Mark (1993) also identify that a cooperative organization of

classroom promotes positive relationships between students, whereby they are encouraged to help each other. In the classroom cooperative learning is implemented, communication is open and information is shared between students. Cooperation also implies that learners give help and assistance to each other's strength and weakness.

Martin (1997) in his study argued that, each child must do the activities, each child must record the observations, and each child must feel free to interact with the teacher and other students. According to his argument, applying cooperative learning in classroom environment leads students to discuss their thinking and their conclusions with one another to establish validity and logical deductions. Discussing their thoughts among themselves often leads to new insights and new ways of constructing concepts that increase meaningfulness. The above argument indicates, only by becoming totally involving in the process and inquiry skills needed to construct sound conceptualizations.

In line with Johnson and Johnson (1991) argued that, in order to have effective cooperative learning the following essential elements are needed.

### **Positive interdependence**

Each group member depends on each other to accomplish a shared goal task. This can be achieved through mutual goals, division of labor, dividing materials, roles, and by making part of each student's grade dependent on the performance of the rest of the group. Group members must believe that each person's efforts benefit not only him- or herself, but all group members as well.

### **Individual Accountability**

The essence of individual accountability in cooperative learning is "students learn together, but perform alone." This ensures that no one can "hitch-hike" on the work of others. A lesson's goals must be clear enough that students are able to measure whether (a) the group is successful in achieving them, and (b) individual members are successful in achieving them as well.

### **Face-to-face (Promotive) interaction**

Important cognitive activities and interpersonal dynamics only occur when students promote each other's learning. This includes oral explanations of how to solve problems, discussing the nature of the concepts being learned, and connecting present learning with past knowledge. It is through face-to-face, promotive interaction that members become personally committed to each other as well as to their mutual goals.

### **Interpersonal and Small Group Social Skills**

In cooperative learning groups, students learn academic subject matter (task work) and interpersonal and small group skills (teamwork). Thus, a group must know how to provide effective leadership, decision-making, trust building, communication, and conflict management. Given the complexity of these skills, teachers can encourage much higher performance by teaching cooperative skill components within cooperative lessons. As students develop these skills, later group projects will probably run more smoothly and efficiently than early ones.

### **Group Processing**

After completing their task, students must be given time and procedures for analyzing how well their learning groups are functioning and how well social skills are being employed. Group processing involves both task work and teamwork, with an eye to improving it on the next project.

## **2.6. Factors Affecting Students' Classroom Interaction**

It is understood that some decisions are likely to promote classroom interaction and facilitate the construction of learning opportunities, while others may impede classroom interaction and obstruct learning opportunities. A number of factors influence the interactive behavior of learners. Some of them are factors related to teachers, students and classroom. In this section, I am going to raise questions "what are the factors that influence student's

classroom interaction and what should mathematics teachers do to overcome these factors?”

### **2.6.1. Factors Related to Teachers**

#### **A. Awareness of Teachers**

Teachers' lack of awareness about what they do or the effect of their behavior lessens their classroom effectiveness. A study conducted by Good and Brophy (1974) provides clear evidence that teachers are unaware of their classroom behavior. These researchers found that teachers differed widely in the extent to which they stayed with students in failure situations (repeated or rephrased a question, asked a new question, and so on) or gave up on them (given an answer or called on some one else).

Emer (1967) also presents evidence that classroom teachers are unaware of much of their teaching behavior. He reports that teachers were unable to describe accurately even simple classroom behaviors, such as the percentage of time that they and their students talked.

Different researchers indicate that teachers monopolize communication in the classroom. Most of the teachers grossly underestimated the amount of time they talked (Emer, 1967). Adams and Biddle (1970) conclude that teachers are the principal actors in 84 percent of classroom communication. These findings suggest that teachers dominate classroom discussion, even though they sometimes do not want to and may not be aware that they behave this way.

Another study indicates that, mathematics teachers who actively instruct and emphasize the meaning of concepts obtain higher achievement from students than teachers who use instruction time for other purpose or assign considerable independent work without much teaching (Brophy and Good, 1987). Thus, unless teachers are aware of how and why they use time as they do, they are unlikely to be effective.

## **B. Education of Teachers**

Teacher's education is a professional experience that requires preparing students in action, intention, habits of mind, ways of thinking about the teaching learning process (Vergia, 1999 and Brad, 2000). However, in a very large undergraduate teacher education classes the subject matter is often in a way that is odd with the content. In a large lecture hall, students may be lectured about teaching and learning and subsequently given a multiple-choice test to assess their learning.

Azeb (1998) states that, as observed in the common practice in our country many people are engaged in training teachers. This is true whether the training takes place in education collages, universities, etc with persons mostly without any dependable ideas (knowledge, skill and attitude) regarding how and for what would be teachers are trained or prepared. This is because they themselves do not have the necessary preparation or training for their important responsibilities. They simply give trainees subject mater and that is what in turn gives the children and the youth (NRC, 2000).

Similarly Farrat (1980) states that, the training of teachers is a crucial factor among the multitude of factors that affect the implementation of teaching method that encourage students to involve in learning. Because the teacher is the final decision maker as regard to actual learning opportunities provided to students. According to Farrat, if teachers lack knowledge of involving students in learning that requires new roles and commitment, implementation will be seriously hampered even if the best curriculum was designed. Hence, provision of pre-service and in-service teacher training is essential to acquaint teacher trainers with teaching learning process that provides opportunities for learners to construct their own mathematical knowledge.

Solomon (2006) indicates that, the foundation for mathematics education is laid during the pre-service education. This period should also prepare perspective teachers to develop their own teaching skills and mathematical knowledge throughout their career. This is because teachers themselves need

experience in doing mathematics-exploring, guessing, testing, estimating, arguing and proving - in order to develop confidence that they can create conducive situation to lead students to follow their own pattern of learning (NRC, 2000).

Therefore, teachers must be prepared so that they understand child development, pedagogy and the structure of subject areas and varied methods of learning (Solomon 2006:46). Extending his idea Solomon said the following by citing Stoddart et.al (1993)

*Teachers who do not have conceptual understanding of the content are not equipped to teach conceptually. They propose that to improve mathematics instruction a new reform of education that integrates subject matter and pedagogy needed. For this reason, teacher education program should be designed to enable and help prospective teacher develop new conceptual perspective through which contents, facts, principles, instruction practices can be personally mandated and negotiated.*

To this end, emphasizing discovery teaching or learning, cooperative learning and group discussions would be excellent ways for learners to explore, develop mathematical arguments, and identify connections among mathematical ideas. However, in order to for these powerful tools to be utilized effectively in the classroom the teachers must have actually learned mathematics by these techniques himself (Jenks and Peck, 1968). The teacher must personally experience the thrill of discover and the intense atmosphere that prevails while one makes a predictions and checks to see if it really work. With this kind of experience, the teacher will be more effective in fostering a dynamic leaning atmosphere in his classroom.

### **C. Ways of Treating Students**

The difference in students' treatment due to teachers' perceptions toward the learners has a negative impact on their performance. Lason (1979) cited in Chaudran (1988) says that, the students difference in their academic performance is one of the reason for the different treatment of students by teachers. Lason further argues that, the teachers differentiate treatment would result in good educational advantages for those who are perceived as good achievers. Similarly, it discourages the low performance students from participating.

Moreover Good and Brophy (1987) studied unfair treatment of teachers that was seen in the classroom. They reported that there are differences in the frequency of teacher contact with students of different achievement levels. Teachers were much more likely to praise high -achieving students, even when differences in the correctness of students' answers were taken into account when high achieving students gave a right answer, they were praised. Similarly, low achievers were more likely to be criticized for wrong answers.

Students' gender also affects the quantity and quality of students' communication with teacher. Studies show that boys have more interaction with teachers than do girls (Brophy and Good, 1974 and Cooper and Good, 1983). According to Morse and Handley (1995), in higher grades, girls initiated to interaction less often in science class, in contrast, the boys' initiation of interaction increases.

Similarly the study conducted by Brophy and Good (1987) indicates that, in mathematics boys receive more academic contacts and instructional time with teachers than did girls. It is likely that some secondary mathematics and science teachers tend to favor boys over girls. For example, Moriis and Handley (1985) found that secondary science teachers spent more time reinforcing and rewarding questions for males than for females. They also found that teacher give males more feed back that prolonged interaction between teacher and

student than females received. They conclude that such interactions reflect higher teacher expectations for boys than for girls.

The teacher, therefore, should be ready to give equal treatment and encourage support for all the students. Alright (1984:167) says "...enhanced respect for the learners from teacher, could lead to enhanced self respect for the learners, themselves". If a teacher has respect for the learners, then learners develop enhanced self-respect that results in an even treatment from the teachers and improves classroom interaction.

Learners, thus, are willing to take risks and become confident enough to interact avoiding the fear of failure. In general, encouraging learners to develop self-respect starts with the teachers' willingness to show the respect they have toward the learners.

#### **D. Teachers' Behavior**

Teachers' behavior is considered by Flanders (1970) as a chain of events performed by a teacher during classroom interaction. The teacher interacts with individuals and groups in guiding the instruction. In this condition every teacher displays a teaching behavior which intentionally (planned) or Unintentionally (unplanned) the teaching behavior. In this way, it has a great impact on the learners' academic progress and performance.

Similarly, Wobbles and Levy (1993) on their study showed that, the behavior of the teacher is influenced by the behavior of students and in turn influences students' behavior.

They assessed eight dimensions of teachers' behavior that influence teacher – students' interaction and summarize it as follows:

**Leader Ship:** - The extent to which the teacher leads, organizes, gives orders, determines procedure and structure of the classroom situation. This teacher knows what is going to happen next in the class.

**Helping / friendly:** - The extent to which the teacher shows interest, behaves in friendly or considerate manner and inspires confidence and trust. This teacher helps the students with their work.

**Understanding:** -The extent to which the teacher listens with interest empathies, shows confidence and understanding, and is open with students. This teacher allows students to take responsibility for what they do.

**Student freedom:** - The extent to which the teacher gives opportunity for independent work, gives freedom and responsibility to students. This teacher allows students to take responsibility for what they do.

**Uncertain:** - The extent to which the teacher behaves in uncertain manner and keeps a low profile. This teacher allows students to tell him/her what to do.

**Dissatisfied:** - The extent to which the teacher expresses dissatisfaction, looks unhappy, criticizes and waits for silence. This teacher thinks that the students cheat.

**Admonishing:** - The extent to which the teacher gets angry, express irritation and anger, forbids and punishers. This teacher gets angry quickly.

**Strict:** - The extent to which the teacher checks, maintains silence and strictly enforces the rules. This teacher is strict.

The facts so far reviewed reflect that teachers' behavior is highly influential on the quality and quantity of students' learning. It obstructs or enhances the participation and performance of students.

## **2.6.2. Students Related Factors**

### **A. Motivation**

One of the factors that may affect classroom interaction in mathematics learning is motivation. As Harmer (2001, 57) defines "motivation is some kind of internal drive that encourages some one to do something in order to achieve

something". The success or the failure of most of students depends on whether the students intrinsically motivated or not. In this regard, many scholars such as Harmer (1991) and Brown (1994) argue that intrinsic motivation has the strongest motivation effect. Thus, harmer (1991) remarks tat lack of interest results in poor performance.

Studies conducted by Nunan and Lamb (1996) show there is the high correlation between motivation and achievement. That is, highly motivated students will do well, initiated to involve in and try to gain practical knowledge in mathematics.

Similarly, Johnson (1995, 40) supporting this idea says

*Moreover, motivation to achieve in school is directly related to whether or not students attribute their school success to their own efforts, rather than to those of others or to factors beyond their control. Clearly academic success and motivation are closely linked to student perception of them selves, as well as what they believe and are not possible in classroom.*

Generally, motivation is some kind of internal derives that encourage some body to pursue a course of action. However, motivating human being is not an easy task. Most of mathematics teachers face problems. This is because most of students have not good image for mathematics subject.

## **B. The Image of Mathematics by Students**

The term image is defined as some kind of mental representation of something originated from past experience as well as associated beliefs, attitudes and conceptions. Since an image originates from past experience, it comprises both cognitive and affective dimensions. Thus, the term image of mathematics is conceptualized as a mental representation or view of mathematics, presumably constructed because of social experiences, mediated through school parents or peers.

According to Ernest (1996), many people's image of mathematics represents mathematics negatively, such that mathematics is perceived to be difficult, cold and obstruct. This indicates, to many people mathematics is perceived as a difficult subject to learn and to teach. This preconception that mathematics is difficult, prevent students from actively participate in the class.

### **2.6.3. Factors Related to Classroom Condition**

#### **A. Classroom Arrangement**

The seating arrangement may inhibit student from participating during classroom interaction activities. So according to Byrne (1987) the pattern of students or seating arrangement need to be made according to the type of interaction activities to be practiced. When conducting classroom interaction activities in mathematics class, we should carefully examine the type of classroom arrangement that fosters the success of students in tasks they are going to be engaged in. With respect to this issue, Christenson (1994: 140) notes.

*The physical and spatial arrangement of the classroom affects cooperative work. If the students in the classroom are to cooperate, activities must be structured so that students can cooperate and talk to each other. If they have conversation with someone, they need to talk face to face.*

The above argument indicates that, the teacher should prevent as much as possible students, sitting by facing each others back. Since we expect students to interact and cooperate in the activities, they should sit close enough to each other. In such sitting arrangement, they can talk to each other without any difficulty. They can also use together the materials they need.

Furthermore, their sitting closer can reduce the noise that may disturb other groups during the discussion. If a disruptive behavior happens while the students are performing group activities, it can be controlled by taking away

the disruptive student from his group to another or placing his desk beside the teacher desk which enables the teacher to give more attention, personal contact and encouragement to students (Moore,1995)

### **B. Classroom Size**

In relation to grouping students for activities that promote classroom interaction, the size of the class has a great effect. It is not sustainable to provide different experiments and group works having many students in over crowded classroom. Syuaztin and Graam (1998) in their study have indicated that, schools in many parts of Africa are composed of large number of students. Thus giving students enough attention and meeting the need of every different student to engage actively in the learning process is difficult. 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 students' involvement in teaching learning process the number of student in class should be optimum.

### **C. Classroom Management**

According to Tsue (2003), Classroom management refers to aspect of classroom organization such that conducting individual, pair or group work, dealing with disruptive behavior and handling daily activities such as collecting assignments and checking students work. Today, teachers are frequently encouraged to create more flexible classroom organization and not to view themselves exclusively in the role of class instructor. Stern (1983) suggests that teachers must aim to produce a learner who is increasingly aware, self-reliant, and better able to learn directly from experience.

Therefore, classroom management is a crucial issue for countries like Ethiopia where the average class size is likely to be between 60 and 90. Atkins, Hailan and Nura (1998) point out that, effective classroom involves creating healthily learning conditions, providing challenging but manageable tasks, and getting students to participate fully.

## CHAPTER THREE

### Methodology

#### 3.1 Research Methodology

The focus of this study is to investigate the nature of the students' classroom interaction in mathematics classes. To put this in to effect, qualitative method was chosen. The reason for choosing qualitative method is, it takes place in the natural setting and helps to collect very detailed data about the phenomena (Camic et.al. 2003:181). Other scholars such as Creswell (2003: 118), strengthens this idea by his words saying:

*Qualitative researcher often goes to the site of the participant to conduct the research. This enables the researcher to develop a level of detail about the individual or place and to be highly involved in actual experiences of the participants.*

Similarly, Hancock (1998) argued that, qualitative research describes social phenomena as they occur naturally. Therefore, this study was used qualitative research method to investigate students' classroom interaction in mathematics classes and major factors influencing this interaction.

#### 3.2 Research Design

According to Solomon (2004), research design is a logical sequence that connects the empirical data to a study's initial research questions and, ultimately to its conclusion. The intention of this study is to collect data specifically to the teaching learning process of mathematics in terms of student's classroom interaction. To answer the basic questions and achieve the objective stated, a qualitative case study design was employed. Stake (1995) in Creswel (2003) stated that, case study helps the researcher to

explore in-depth program, an event, an activity, a process, or one or more individuals.

Extending his argument Creswel(2003) said :

*The cases are bounded by time, activity, and researchers collect detailed information using variety of data collection procedures over a sustained period of time.*

Furthermore, Solomon (2004) has pointed that, case study in general is a preferred strategy when “how” or “why” questions are posed and when the investigator or researcher has minimum control over events. Therefore, I selected this strategy to get detail information and to generate evidence to answer the research questions.

### **3.3 Subject and Sampling Procedure**

For the purpose of the study, two groups of subjects were selected-grade ten students and their mathematics teachers in the targeted schools, in Borena Zone of Oromia Administrative Region. Borena zone has eleven secondary schools of which the researcher selected Abaya, Tore and Gerba Secondary Schools purposely from five non-plasma schools. The reason for selecting non-plasma schools is that it helps the researcher to investigate students' classroom interaction in-depth. Because the classroom in which teaching learning process is guided by teacher is more convenient to examine students' classroom interaction rather than classroom guided by plasma television instructor.

For the first group twenty-two grade ten students were selected purposefully-eight of them for interview and fourteen of them for focused group discussion. Because, these students were expected to give rich information to the researcher due to their communicative skill and the attention they give for their learning. Similarly, mathematics teachers of grade ten levels were taken as subjects of this study. There are seven mathematics teachers in the

targeted schools. From these four of them were included in the study as informants. The teachers were included as subjects of this study because they teach mathematics and they are familiar with the problems of their students in interacting among themselves in the classroom while they teach them. These teachers were believed to have relevant information about the nature and factors that hinder students' classroom interaction in mathematics classes.

### **3.4. Rationale for Selecting Research Setting**

Identifying an appropriate research setting is one of the most prominent tasks. According to Marshall and Rossman (1995) cited in Anduaem (2006:36), the criteria in choosing research site is:

*... if entry is possible; if there is a high probability of accessing reach information; trust and relationship with participant; and data credibility and quality of the study relatively assured.*

Having the above point of view in mind, I selected the research topics, site and informants based on the following criteria.

The first important decision was made in choosing the subject to be studied. I chose to investigate students' interaction in Mathematics classrooms because I have taught mathematics for many years. Therefore, I am familiar with the subject and personally, I have some insight into the problems that the students have in learning mathematics. This is the reason that initiated me to investigate the nature of students' interaction in mathematics classes.

The other decision was made in choosing research site. Since I have been teaching in Borena Zone for long time, I have had special acquaintance to educational administrative bodies as well as teachers in the schools. These factors have facilitated my entry and access to the research setting and there by develop confidentiality among the research participants.

Finally, in Oromia region Oromigna is used as medium of instruction up to grade eight. Schools use English as a medium of instruction starting from grade nine. Therefore, grade en students were considered as suitable subjects for this study because they have exposed to English for two years than grade nine students. I believed that this could help them to express themselves as well as to share their idea with their partners in classroom.

### **3.5. Tools and Procedures of Data Collection**

Educators have advocated the use of multiple methods of data collection. Because by selecting complementary methods, a researcher can improve the weakness of one method with the strength of another. It is recommended that, good qualitative case study will often include multiple methods of data collection and advised that, no single source have a complete advantage over all others. In-depth interview, observation and focus group discussion have been stated as key ways of collecting qualitative case study data (Yin, 2003; Best and Khan, 1993 and Merriam, 1998). The use of more than one data collection techniques in a single study helps the researcher to substantiate the strength and to correct the defects of any one source of data. Having this point in mind, I employed unstructured observation, interview and focused group discussion as a data collecting tools.

#### **3.5.1 Observation**

Participants' observation has been the primary data collecting techniques used by qualitative researchers (Creswell, 2003). This is because the real instructional activities are manifested in the classroom while the teaching learning process has been taking place. It is in the classroom that the experiences of students, the instructional methods used; classroom conditions and other necessary facilities meet and interact.

Observation is a fundamental part of social activity and a critical tool to look on the form of social interaction (Miiller and Brewer, 2003). Therefore, classroom observation was one of the main data collecting instruments in this

study to assess what is going on in mathematics classes in terms of students' interaction.

For this study, four sections from grade ten were selected for observation. Two sections from Abaya and the rest two from Tore and Gerba secondary schools. Each of them were observed at five different times with different topics. The observation has lasted five weeks and some of them recorded by video camera. I used unstructured observation format and recorded every activities that occurred in the classroom.

On the first day of my observation, I explained myself and the purpose of my research to the students. Then, I requested their willingness to collaborate with my research work. They showed their volunteer without any opposition. However, some of the students did not feel comfort. Considering this situation, I asked permission from the teacher and discussed about the purpose of the study and the use of its findings for maximizing their learning at the last five minutes of the class time. This made the tension some what relaxed.

My role was passive observer and recorded every activities that occurred in the classroom without any interference. In these sections, a critical observation of the class-room realities such as the method of teaching and learning, students participation, interaction between students & teachers and students and students, the classroom behavior of teachers, the way teachers treat their students, the effort of teachers to initiate students to take responsibility of their learning, the commitment of teachers to organize group discussion and activities, the way teachers manage their classroom, appropriateness of the classroom and classroom facilities, and others were conducted.

### **3.5.2 Interview**

The second data collection strategy was unstructured interview. The interview permits depth response, which may not be possible through any other means. It also enables an interviewer to get information concerning feelings, attitude or emotions in relation to certain questions (Bryman, 2000).

According to Best and Khan (1993), the purpose of interviewing people is to find out what is in their mind, what they think or how they feel about something. Similarly, Robson (1993:228) explained the importance of using an interview like this:

*Interview carried out for research or inquiry purpose are very commonly used approach, because the interview appears to be a quite straightforward and non-problematic way of finding things out. The situation provides the interviewee the opportunity to describe hi/her idea and to give more emphasis on what he/she thinks important.*

Taking this idea into account, in this study unstructured interview was used to collect information about perception and interest of teachers and students, the methods that teachers used to present their lesson and factors that influence students' classroom interaction from the targeted subjects. For this purpose, four grade ten mathematics teachers and eight students were selected. All of the teachers were males and among the students, three of them were females while five of them were males. They were selected because they are expected to give deep information for the researcher and they are the members of the targeted schools and grades that the researcher intended to study. Each participant were interviewed by using tape recorder in order not to miss important issue and misinterpreted the data later. Recording was made based on the agreement made with participants.

As pointed by Hancock (1998:45) in handling qualitative interview, tape recording is preferable. This is because the interviewer can

*Concentrate on listening and responding to the interview and is not distracted by trying to write down what has been said. The discussion shows because the interviewer does not have to write down the response to one question before moving to the next.*

Furthermore, he noted that tape recording ensure that the whole interview is captured and provide complete data for analysis. Accordingly, recording the interview has helped me to listen repeatedly the recorded discussion after the interview in order to understand the participants' point of view.

The interview was conducted in the school compound, which is in free classroom. The conversation was conducted in Amharic and Oromigna in order to enable us to understand each other easily and to create conducive environment for the respondents to express their inner most feelings and understandings about the issue under discussion. All recorded interview and focused group discussion were transcribed by the researcher word by word and recorded on notebook. Since these data were obtained using Amharic and Oromigna, they were translated into English and written down on the notebook. The translation was done by the researcher with the help of one English teacher.

### **3.5.3 Focus- Group Discussion**

In this study, the focus group discussion was used as a third technique to obtain in depth information about the issue from different point of view. This is because making discussions among individuals (two or more) may provoke individuals mind to more ideas depending on each others opinions. Willington (1996) stated that, focus group discussion among members of small groups has been considered as a good instrument to capture versatile information. Because it is a form of qualitative research that help a group of people to ask about their perceptions, opinions and beliefs towards the topics under discussion. With regard to this, Wamahiu and Karugu (1995) explained that focus group dissuasion is a best suited for obtaining data on group attitudes and perception by initiating members for active participation. They added that in combination with classroom observation and interview it could be used for gaining access to various data. Therefore, this technique was employed to strengthen the information that obtained from other tools and to achieve the

validity of data that obtained from observation and interview by triangulating them with the data obtained through focus group discussion.

Fourteen students were participated in the discussion. Three of them were taken from the students who were participated in the interview. I did this considering they may generate more new idea based on the ideas given from other students. Each focus group was composed of equal number of both sexes. I led the discussion and did not allow a few individual to dominate the discussion. Care has been taken to make the particular topic exhaustive. Based on the idea given by the individual participants, I tried to ask the opinion of other participants whether they support or oppose it. And also, I tried to identify the ideas rose on the discussion are the feeling of particular participant or most of the participants. Finally I used the ideas that reflect the opinion of most of the participants for the analysis purpose.

The discussion has focused on the interest and awareness of students toward classroom participation and doing in-group, the ability of teachers to facilitate interactive learning, the classroom behavior of teachers and factors that affect classroom interaction. The discussions were recorded using tape recorder with the consent of the group members.

### **3.6. Method of Data Analysis**

Bargan and Biklen (1992) have shown that data analysis in qualitative research involves word argumentation than numerical explanation. Therefore, the data collected through unstructured observation, interview and focused group discussion have presented, discussed and interpreted qualitatively by categorizing in themes after it has studied carefully and repeatedly. Instead of analyzing data for each case separately which might makes the report bulky, I employed inter case analysis. The reason for employing inter-case analysis is, even if the three sites found in different geographical location, all of them are government schools, they use the same curriculum, they have the same profile, they found in the same socio-economic status, and there is great

similarities among the collected data from these sites. Instead of using real name of the respondents, I used pseudonyms.

### **3.7. Ethical Consideration**

Denzin and Lincoln (1994) stated that ethical issue should be given serious attention in qualitative research. Considering this, to make the research participants well aware of the purpose of the research, I made discussion with them before the beginning of data collection. As a result, the participants were informed about the nature and the consequence of the research. Furthermore, I informed the participants that they have full right of expressing their idea on the topic under discussion without any restriction and they have the right of ignoring themselves from the stud if they want.

### **3.8. Effort**

In the process of conducting this research, I tried to exert the maximum effort in data collection, analysis and interpretation. I tried to have a positive relationship with the school compound in general and the informants in particular. Furthermore, I consulted my advisor and my colleagues to get their valuable suggestions and comments on my research report.

### **3.9. Triangulation**

Triangulation in this study was intended as one way of securing validity. Because, the trustworthiness of the data is justified by triangulation. As discussed by Guion (2002), triangulation helps the researcher to check and establish validity in his/her entire research. Therefore, to have a credible data for analysis as well as interpretation of the data, and to verify my findings, I have triangulated the data gathered from students with that of teachers. More over, the interview data was crosschecked with observation and focused group discussion.

## **CHAPTER FOUR**

### **Data Presentation, Analysis and Interpretation**

In this chapter, an attempt has been made to analyze and interpret the data gathered from target groups in Abaya, Tore and Gerba Secondary Schools. The data was collected from March 1-2010 up to April 3-2010 using three procedures. Accordingly, data obtained from classroom observation, interview and focused group discussion were integratively presented and analyzed in the following organization themes derived from the research questions. There are the situation of classroom social interaction, students' classroom participation, cooperative learning in mathematics classes and factors influencing students' classroom interaction.

Accordingly, these themes were discussed in the order they are put above and the data gathered through the three tools were presented in any order as a required.

#### **4.2. The Situation of Classroom Social Interaction**

Social interaction is the key element in the learning process. As discussed in the review part the more opportunities children have for social interaction with their peers, parents and teachers, the more viewpoints they will hear (Davidson,1990). In this section, I tried to investigate what the classroom social interaction looks like. To do so, I considered the behavior of teachers in classroom interaction, the devotion of teachers in facilitating classroom interaction, the proportion of the classroom time used by teachers and students, and student's initiation in the classroom discourse.

##### **4.2.1 The Behavior of Teachers in Classroom Interaction**

As reviewed in the literature, Wobbles and Levy (1993) assessed eight dimensions of behaviors of teachers that influence teacher-students interaction and divide them into two categories. The first category is the

behavior associated with attractive classroom environment including higher level of leadership, helpful or friendly, understanding interpersonal behavior and behavior, which gives students responsibility and freedom. The other category is behaviors associated with undesirable classroom environment such as uncertain, dissatisfied, admonishing and strict. These categories of behaviors encourage or discourage the student's social classroom interaction. If teachers reflect the behaviors that are listed in the first category in the classroom; the students will be free to express their opinion, encouraged to interact with their teachers and with each other. The respondents during interview also mentioned that, students felt ease when teachers are warm, friendly, open, and humorous and respect their ideas. Regarding this Leyla, student participant states her feeling like this:

*Our teacher encourages us to ask or answer questions. Even if our response is not correct, he did not disappoint on it. Instead, he facilitates the opportunity to correct our mistakes by ourselves. He is warm and shows friendly manner to students. For this reason, I am free and open to tell him what I feel about the activities or situations that going on in the class.*

(Leyla, March 10, 2010)

Among the result of interview there was an indication that a teacher perceived as being very helpful and friendly tends to have classroom in which students were more likely to state what they thought rather than to wait for others in the class to give their opinions.

Similarly Markos, one of the students describes how supportive, humor and open teachers behavior initiates him to interact actively in the classroom.

*I talk in the class what I feel. Whether it is correct or not, that is up to its (የራሱ ጉዳይ). During classroom discussion, I raise my hand and try to share my idea. I ask what is not clear to me. I did not Passover it, whether it is difficult or easy. Moreover, I try to answer the questions raised by the teacher or the students. This is because our mathematics teacher treats us properly. If we made a mistake, he would give us a chance of correcting it. He helps us to arrive at the correct answer. So I talk freely what I know.*

(Markos, March 8, 2010)

Supporting the idea of Markos, one of the teachers expressed his opinion saying:

*I try to encourage my students to ask any questions. I also initiate them to speak what they have in mind about the questions raised in the class. I do not worry about the level of questions or the types of answers that they give. Because, I think that trying is the way that leads to success (መከራ ወደ ውጤት የሚያመራ መንገድ እንደሆነ አሰባለሁ)*

(Yesuf, March 11, 2010)

Extending his idea, he said that giving encouragement is necessary to keep the learners in the interaction. Giving students proper treatment has its own benefit in teaching mathematics in pushing learners to take part actively and gradually to build their confidence in expressing their ideas regardless of the fear of making mistakes. He added that if learners try to correct their errors by themselves; they could learn many things form their errors. In addition to this, giving encouragement for learners to correct their errors is important to build

up their confidence and feel proud of themselves, they can also learn through discussion.

Therefore, one can understand from the above discussion teachers who love their students, who treat the mistakes of their students in appropriate way, who give them freedom and responsibility, who trust them and develop confidence in them can encourage social classroom interaction.

Furthermore, classroom observation assured that, when teachers let students to continue their speaking and do not interrupt them for correction, they prefer to finish their speech.. This shows that, the teachers careful error treatment helps students to be encouraged to interact (exchange their idea) without fear of criticism from the teacher and peers while interactive activity is in progress.

On the other hand, teachers who are dissatisfied behaved in uncertain manner and gets angry quickly lay a shadow in the classroom atmosphere. According to the student respondents, the interactive atmosphere of the classroom depends on the teachers' behavior. One single word of the teacher or facial expression that is seen for a little second can kill students' initiation to make active classroom interaction for a long time.

For example, one of the students, who prefer to be kept silent in mathematics classroom indicate the reason of his silence.

*Teachers' behavioral problem has a great factor to inhibit students from making active participation in the classroom. For example, there are teachers who insulted the students for their wrong answers. It is difficult to raise my hand in front of these teachers to give answer or to ask questions.*

(Worku, March 18, 010)

In line with this, in one of my classroom observation, the student raised his hand to ask question and was permitted. His question was what already the teacher has spoken before few minutes. The teacher replied with angry tone “Did you sleep when I discussed about it?” When I look at the student, he felt shy and started looking to his exercise book.

Bekele, one of the respondent students, during the interview stated that, teachers’ behavior restricts what to speak in the classroom.

*Our teacher gets angry quickly. Even some times, he decides not to teach us and leaves the class for minor cases. At this time, we will send one representative to apologize him. For this reason, we care for what to speak when he is in the classroom.*

(Bekele, March 8, 2010)

In general, if the time devoted to accepting students feelings, respecting students ideas, encouraging and praising is higher than time devoted to critics and giving direction, the classroom interaction becomes high.

#### **4.2.2 The Devotion of Teachers in Facilitating Classroom Interaction**

Researchers remarked that teachers should be skillful in their classroom approach to create eliciting and modeling effects in the process of classroom interaction (Prodromou, 1992 and Hedge, 2000). By doing so, students could be motivated to use their rich diversity of background knowledge and experiences that can in turn generate active and lively classroom interactive atmosphere. Based on the researchers view and objective of this study, it is important to ask, “How can teachers support meaningful and high – quality students interaction in the mathematics classroom?”

This is because, the complex negotiation of math – talk in the classroom requires facilitation skills and heightened attention to classroom dynamics

(Bruce, 2007). The teacher must model math – talk so that students to justify their solutions and build on one another idea and finally step aside as students take increasing responsibility for sustaining and enriching interactions.

Research has firmly argued that higher order questions are correlated with increased students' achievement particularly for conceptual understanding (Bruce, 2007). Its benefits increase further when students share the reasoning with one another. Therefore, mathematics classroom should function as a community where thinking, talking, agreeing and disagreeing are encouraged. This can be realized when the teacher provides students with powerful math problems to solve together and the students are expected to justify and explain their solutions.

From the above discussion, one can understand that well organized questioning and classroom group discussion can lead students to active classroom social interaction.

### **Questioning**

Different studies in the area of classroom research have underlined that questioning plays a fundamental role in the interactive phase of teaching (Martin, 1997 and Good and Brophy, 1987). Their reason for this argument is, questioning promotes interaction. Open-ended questions with longer wait time and longer think time goes a long way toward fostering learner's beliefs that their own thinking is important. The application of this argument requires highest teachers managing ability of question that leads to hot discussion and their devotion for committing their time.

Classroom observation revealed that, teachers' level of performance in initiating students instructional involvement by asking questions of different cognitive level and in asking inquiry questions related to the content being taught was found to be negligible. For instance, words like how, why, explain, justify etc were not used to begin the question to trigger an inquiry discussion.

Instead, the observed teachers appeared to use questions for feedback purpose like “What is the formula of volume?”, “Is it clear?”, “Did you get an idea?” and the like.

For example, in one of the classroom that I observed the teacher entered to the class and greeted the students. Then he put his teaching materials on the table and started to revise the previous lesson after writing the topic of the day.

*Teacher: what is the shape of the base of a cone?*

*Student: Circle.*

*Teacher: what is the surface area of a cone?*

*Student: pie ( $\pi$ )-times-radius-times-slant height.*

*Teacher: how can we find the volume of a cone?*

*Student: by multiplying base area and altitude.*

Moreover, he asked another question and I observed when students repeatedly answered in mass by saying “Yes/No” and a response contain one or two words. This indicates each student’s ability of comparing, contrasting, analyzing, synthesizing, reasoning, evaluating etc based on evidences were limited by the teacher’s way of questioning.

Furthermore, classroom observation illustrated that teachers even begin and end class by asking question. However, they did not give enough time and opportunities for students to interact. Regarding this, one of the student participants, indicated this condition by saying;

*Before starting the lesson, our teacher asks us about the previous lesson for two or three minutes. Similarly, he asks us at the end of the lesson to see whether we understood or not the lesson presented. Most of the times, the questions contain facts, formulas and definitions which can be answered by memorization.*

(Bekele, March 8, 2010)

This also goes with classroom observation. I observed when teachers would quickly move to engaging themselves on exercises and home works rather than practicing interactive activities. Teachers rush for course coverage and so would like to stick only to the textbook. As a result, it seems that classroom interaction that may be created due to teachers question was less and the involvement of students as partner of the instructional process appeared to be less.

### **Classroom Group Discussion**

Organizing students in groups motivate participation. Group discussion provides students with an environment that they can communicate freely and easily. It also lowers the inhibition of learners who are unwilling to speak in front of the whole class. Therefore, mathematics teachers should know that small-group interaction allows more talk for each of the students, and a greater variety of talks. In this situation, students can get a chance to exchange ideas, to ask questions freely, to explain to one another, to clarify ideas and concepts, to help one another, understand the ideas in a meaningful way, and to exchange feeling about their learning (Davidson, 1990). To facilitate this, classroom interaction activities have to be run under effective classroom organization and it needs commitment of the teacher.

The data obtained from classroom observation and interview of the teachers revealed that there is weak facilitation of classroom interaction. For most of the teachers, it seems that involving students in active classroom interaction is asking few questions during the beginning and end of the class. Of course, well-organized questions can initiate classroom interaction. However, it is not the only means. If there is a commitment of teacher to facilitate active classroom activities, there are varieties of techniques that initiate students to involve in active classroom activities. However, due to different reasons, teachers are attracted mainly to use question and answer method. In line with this, one of the teachers said:

*Mainly I initiate students for participation by asking question. I use this method most of the time before or after explaining the lesson. I prefer it because it saves my time and gives a chance to students to share their ideas on the topic at hand.*

(Tolosa, March 11, 2010)

This indicates that teachers attracted to this method in order to cover the material in a given time.

As the investigator observed, the prevalent pattern that existed was correction of homework on the blackboard. Followed by introducing the new topic students then asked questions to be answered orally. After that students copied mathematics exercises which the teacher had done on the blackboard in to their notebooks. Finally, home work was given to the students and the teacher leaves the class. This is common for most of the observed teachers. Regarding this, one of the students stated that:

*Most of the time, he gives us correction for the homework that was given last time. After that, he introduces the lesson of the day and explains it. At the last, he gives us a time to take note from the black board. If there is enough time he gives us class work to be done individually, otherwise, he gives us homework.*

(Hana, March 12, 2010)

For doing this, teachers complain the past learning experience of students and the excessiveness of learning materials that should be completed in one year. Regarding this, Tolosa discussed that, most of the time he uses question and answer method at the beginning and at the end of the class to check to what extent the students understand the material. Rest of the time is used for presenting the instruction that is intended for that period and for giving the students class work and homework. As he argued he know that using different

techniques that foster students' learning by initiating them to construct their own knowledge. However, he stated different factors inhibited him from exercising it.

*Even if I know different interactive activities that can maximize the knowledge of students, it is difficult to conduct these activities. This is because of the past learning background of the students. There was lack of practice exposure and insufficient exercise in the lower grades. The main target of teachers in those grades is to complete the textbook in a given time. Because, they are evaluated by this. This is also true for me.*

(Tolosa, March 11, 2010)

According to Tolosa, these situations were the main factors for students to develop negative attitude to practice classroom interaction. He also indicated that, the students did not like the interactive activities that conducted in the classroom. They rather preferred to do individual work like class work or homework. Thus, the teachers encountered many problems while they were trying to implement the activities. Furthermore, Tolosa forwarded that, he tried to facilitate group discussions many times by selecting the topic that initiates the students to discussion in-group or giving problems to be solved in-group. Nevertheless, he said that he did not see when they interact to each other to solve the problem.

*When they faced minor problem, instead of trying to seek its solution by themselves they call me and ask me "how can we solve it?" They wait for the teacher for each problem they encountered at discussion time. In my opinion, this is killing time. Because, either the students did not interact to each other in appropriate way or I did not use my time properly.*

(Tolosa, March 11, 2010)

Systematic and frequent use of small group procedures have a profound positive impact upon the classroom climate; the classroom becomes a community of learners actively working together in small groups to enhance each persons mathematical knowledge, proficiency and enjoyment (Davidson , 1990). However, the classroom observation as well as the interview result revealed that the commitment of teachers to facilitate group discussion is amusingly very low.

#### **4.2.3. The Proportion of the Classroom Time Used by Teacher**

Studies have reported that in most teacher-centered classrooms interaction, teachers' talk accounts for more than 70% of the class time (Tusi, 1995). In such condition, it is mostly the teacher, who initiates, determines and fixes the nature and patterns of classroom interaction. The reasons as attempted by Tusi (1995) and Shumin (1997), might be that students may be reluctant or self – conscious or lack of experience to engage interactive activity.

Similarly, the result of the observation showed that, the teacher dominates the classroom talk and interactive activities directly or indirectly. Teachers talk almost more than 75% of class time, though with students, there is insignificant participation. During the interview teacher respondents argued that students at the lower grades did not have the experience of participating and they become unresponsive when they reach secondary schools.

On the other hand, teachers indicated the excessiveness of the learning materials and different improvements in educational policy that needs immediate outcomes forced them to monopolize the classroom talk. Concerning this Yesuf argued that:

*For example, I am asked to maximize the student result from 56% to 70%. It must be done in three or four months. I planned it and submitted to the office. Now I am afraid to fulfill it. On the other hand, the students are going to take national examination. This is also another thing, which is bothering me. Because I have to make them ready for the examination. In addition to these, the learning materials are too large to cover in specified time. Therefore, to fulfill these things I prefer to give much information to the students. Giving much information requires much time.*

(Yesuf, March 12, 2010)

Classroom observation result supports the idea of Yesuf. Teachers were seen when they present very much information that are difficult to grasp in 40 minutes. Simply, they talk and write on the blackboard starting from the beginning to the end and students hurry to copy down the written information from the blackboard ignoring of listening the teacher's talk. This implies that for most of the teachers the students mind is seen as a store and they filled it with excess amount of information. However, giving much information is not making students to grasp the intended knowledge.

To sum up this, learning outcome cannot be seen at over night. It is a gradual process. However, teachers as well as authorized persons who are concerned to the improvement of quality of education instead of taking it as gradual process, they expect a change in a short time. Therefore, they plan the activities without considering the time required for implementing the planned activity.

#### **4.2.4 Students Initiation in the Classroom Discussion**

Dary and Terry (1993) have noticed that, if the students had no appropriate perception on the procedures and participatory activity (interactive learning),

they are liable to develop negative interest for various reasons. For instance, a student who used to exercise traditional, passive instruction method that requires only listening may look shy and uncooperative or destructive and oppose engaging in classroom activities.

The main intention here is that, there is a strong tie between human interest and their effort to implement or practice of any task. This is because; interest is a feeling or emotion that causes attention to focus on an event. Similarly, in order to implement classroom interaction, the implementers should develop the necessary positive attitude toward the activity that requires their involvement.

Concerning students' interest toward interacting in mathematics classes, the interview of both teachers and students indicated that they have no interest even to learn mathematics. This is because the image that was grown in their mind inhabits them from participating in mathematics classroom. In line with this, one of the students shares his idea like this:

*For example, in history and geography classrooms most of the students show interest of participating and exchanging their idea. However, in the mathematics classroom nearly all of the students (except three or four students) keep silent. In my opinion, the students have no good image of mathematics. They perceive it as hard subject that cannot be tried.*

(Mebrat, March 24, 2010)

The response of Worku also referred the experience that they developed in lower grades has a great share to develop negative interest to students' active participation. Furthermore, he said:

*I do not like speaking in the class. I like listening while I am learning any subject. I listen instead of speaking.*

(Worku, March 18, 2010)

In general, respondent students expressed in the interview that as they did not enjoy the activities they perform in the class, they hardly made any effort to involve in the tasks that need their engagement. The classroom observation also proved the same result that most of the students preferred to keep silent in pair and group tasks.

### **4.3. Students Classroom Participation**

Students do not learn much just by sitting in class and listening to teachers memorizing prepackaged assignments, and spitting out answers (ICDR, 1999). They must talk about what they are learning, write about it, realize it to past experiences and apply it to their daily lives (Davis, 1993). This is to say that students should be given the opportunity to participate by asking question, offering examples when called for, sharing ideas that maximize classroom discussion, and supplying answers when asked.

Having this in mind, in this section I tried to investigate image of students' classroom participation. To do so, I assessed the awareness of students to class participation, distribution of participation among learners, and the impact of time on students' participation.

#### **4.3.1. Awareness of students to class participation**

Classroom participation that requires some interaction frequency originated from effective classroom management and student learning. Students clearly should be made aware of the advantage of classroom participation, the behavior that required for participating in classroom, the contribution of their participation to their learning and other similar facts of classroom. As indicated by Petress (2006), some of this awareness can come from group discussion between students and the teacher early on the school year. This is because students who feel invested from beginning in making the discussion successful will be more likely to work together to increase participation (Davis, 1993). This can be achieved if teachers encouraged and motivated students to maximize their participation.

Teachers ability in encouraging learners to participate, contribute a lot to create to take sense of responsibility for their learning and develop interests of leaning mathematics. However, the real situation of classroom is different from what is stated in the literature. Even if teachers said they tried to encourage students giving marks to those who actively participated, the students were not seen when they initiated for the required behavior during classroom observation. With respect to this, one of the teachers described the effort that he made to encourage his student as follows:

*For example, I tried to initiate them to participate by giving marks for their active involvement. However, the result is not as such satisfactory. You may use different techniques to encourage them; however, it is difficult to get them in the required activities.*

(Abera, March 17, 2010)

Teachers try their best to encourage their students using different strategies but the result that they received becomes discouraging for them. The students also witnessed this situation. According to these students, the most and the liked techniques that teachers use to increase participation is giving mark. Even if they are given marks as bonus, most of the students did not want to participate. Hirut, student participant, elaborates the strategy that teachers follow to initiate students classroom participation as follows:

*Of course, our teacher gives us if we answer questions or solve problems on the blackboard. However, there are very few students who try to do this.*

(Hirut, March 16, 2010)

According to the interview conducted with teachers and students, the most preferred strategy to maximize students' classroom interaction was grading their participation.

However, some researchers do not support grading students' participation. For example, Davis (1993) argued that, grading based on participation is inappropriate, that is, subjective and non-defensive if challenged. He also noted that such decision might discourage free and open discussion, making students hesitant to talk to fear of revealing their ignorance or being perceived as trying to gain grade points. It seems that the strategies used by teachers were inefficient to initiate students to participation. Because, teachers are less interested in improving students' participation in their subject by devoting time and thought in shaping the environment and planning each class session.

Researchers believe that, to get students involved in class participation teachers must discuss with their students about the required behavior before they start to implement it (Davis, 1993 and Petress, 2006). Otherwise, they cannot capture the students' willingness directly entering to the activities that need students' involvement. Before asking students to enjoy in classroom participation, teachers should tell the contribution that it has for their learning. However, the discussion made with students revealed that, teachers wait active participation of students without informing the benefit they obtain from participating in the classroom activities. With regard to this, one of the participant students said:

*During the first day of the class, teachers might introduce their name and the subject they teach. Then, they told us to keep silent during class time and to do class work and homework. But, I did not remember a time when our teachers gave us awareness about the behavior that we must have in order to involve in classroom activities.*

(Worku, March 18, 2010)

Teachers expect students to be active participants in the classroom. On the other hand, the effort they made to aware their students about the classroom behaviors that help them to participate willingly was very low.

Therefore, from the above discussion, one can understood that, the failure of teachers to aware students about the contribution of their participation to their learning and the behavior that expected during classroom discussion.

#### **4.3.2. Distribution of participation among learners**

By nature classroom is the place where equal opportunity of leaning is provided for all students. The students must get equal chance of asking questions, giving answers, supplying idea and involving in discussion. In short, if only few students participate by volunteering answers, asking questions, or contributing discussions, classrooms become to some extent lost opportunity to assess and promote learning (Davis, 1993). One of the serious problems that were observed during classroom observation is some students dominating interaction activity. Most of the students could not get a chance to talk, ask or answer questions since the teacher gives many of the opportunities to few students. The common behavior of all observed teachers was relying on the same volunteer students to answer every question. For instance, in his response, one of the teachers stated:

*When you invite the students to participation, the hands that were raised might be two, three or at most four. So I am forced to give a chance to those who raised their hand. Other wise imposing participation on the learners in the absence of volunteer may be resulted in anxiety to them.*

(Tolosa, March 11, 2010)

From the above response, we can understand that instead of pushing students toward participation teachers ignore the students who do not have interest. Another teacher indicated that when a teacher repeatedly called silent or shy

students they show sense of tiredness and they are starting to hate that teacher. Therefore, most of the time, to save their time or due to absence of initiation of students, teachers give a chance of participation to volunteer students. Students also proved this situation saying:

*After asking questions, teacher search for the students who raised their hands. If they get one or two hands, they will give a chance to those students. Otherwise, they will give a chance to those who are expected be give answers*

(FGD, March 26, 2010)

According to FGD the reason for this situation are students' lacks of motivation to participate in the classroom.

However, in opposition to these teachers idea Davis (1993) argued that teachers must do all they can to ensure that the classroom dynamics and activities support full participation, including calling on students who do not raise their hands. According to him, teachers should move to a part of the room where quiet students are sitting, smile at and make eye contact with these students to encourage them to speak up. However, this is not the practice of teachers who were observed. This situation can made silent students to be more silent. Because the longer a student goes without speaking in class, the more difficult it will be for him or her to contribute.

In general, what was noted from classroom observation as well as the interview, there was no sign of giving equal chance for participation in classroom discussion. Rather, there was a tendency of giving opportunity to active students.

#### **4.3.3. The Impact of Time on Students Participation**

Studies indicate that increasing teachers wait time maximize the quality and quantity of students participation (Allwright and Bailey, 1991). This is to mean

that time given for a task should be sufficient to achieve the objective of the task. Teachers have to pause before they call on anyone after asking the question. This allows students to think before trying to answer or hearing the answer from other students. However, the students witnessed that the classroom situation is different from this. As the focused group discussion members explained their idea, teachers do not have patience to give a wait time for the asked questions.

*Of course, he asks us orally. Sometimes he calls one student and invites him to answer. However, if that student did not answer as soon as his name is called the teacher will search for other student to answer the question.*

(FGD, March 19, 2010)

During classroom observation, teachers seem afraid of silence. After writing or asking question immediately, they were seen calling on the students. If they did not get the expected answer, they would immediately jump to the other students. For this reason, students did not have a time to think about the answer. This situation is discouraging to the students who need time to think about the question.

When observation was conducted, some students in every observed classroom quickly raised his /her hand to answer the nearly every question. Teachers were also seen when they consistently called on this student. Therefore, the students who required more time to formulate answer forced simply to learn waiting for this student to answer.

The time given for the group discussion is also often very short and so they cannot often get a chance to participate on such discussion. The main reason for hurrying up of the teacher is the interest of running to cover the course content. Therefore, they are not patient enough to wait the students until they will analyze, synthesize and evaluate information in discussion with other

students. The students that participated in the focused group discussion indicated that, teachers give group activities without considering the left for completing the task. They explain this situation like:

*Sometimes he tells us to form a group and gives us problems to be solved in a group. Nevertheless, immediately he will tell us that the time is over or the bell rings. Therefore, it is difficult to understand and to solve the given problem in short time. It is clear that mathematics needs much time even to understand the problem.*

(FGD, March 12, 2010)

The discussion made with students showed that, teachers suddenly intend to give group work or group discussion without recognizing the time that is required to complete the given task. According to these students, most of the time teachers give such activity when they have left with minimum minutes not more than five or six minutes.

In general, due to lack of awareness of students to class participation, domination of participation by active students and shortage of wait time given by the teacher, students' classroom participation was not attractive.

#### **4.4. Cooperative Learning in Mathematics Classes**

In cooperative learning, students work with their peers to accomplish a shared or common goal (Johnson & Johnson, 1991). The goal is reached through interdependence among all group members rather than working alone. Each member is responsible for the outcome of the shared goal. This can be developed through structured tasks that the teacher to divide the class into group and require each group to complete the task with all members participation for mutual benefit. Therefore, the role of the teacher is crucial.

According to Stockyard and Mayberry (1992), to have an effective cooperation group, teachers must know their students well. This is because grouping of students can be a difficult process and must be decided with care. When grouping the students teachers must consider the different learning skills, cultural background, personalities and even gender when arranging cooperative group.

However, the practice of classroom situation is different from this. As I considered from the classroom observation, the teacher entered to the class and gave ten or fifteen minute lecture. Following that, he wrote three problems and ordered the students to form groups. They form a group of three, four, five, and six members as they like and the discussion was started. The pattern of discussion is different for different groups. The group that contains active students made discussion where as the rest of the groups was completely out of the discussion. They called the teacher repeatedly and asked him questions. I observed when he was called for more than three or four times in one group. Finally, the time given for the discussion was over and the teacher invited students to present their result. One voluntary student from the active group came to the blackboard and presented their work.

At the end of the class, I asked the teacher to interview and he agreed.

*Researcher: I saw only one group who made discussion.*

*Teacher: Yes, you are right.*

*Researcher: What is the reason?*

*Teacher: That group contains academically good students in the class.*

*Researcher: I think active students select each other ignoring medium and low achievers.*

*Teacher: Yes, that is right.*

*Researcher: If it creates this situation, instead of giving right of forming a group to students why do not you form mixed ability group?*

*Teacher: I tried so many times. However, it is disappointing especially for active students.*

*Researcher: Do you believe that cooperative learning is taking place?*

*Teacher: The reason is that why I discouraged to apply cooperative learning most of the time.*

The above classroom observation and interview indicates that, there is lack of experience in both teachers and students. Cooperative learning needs well skilled and interested teachers to be implemented. In accordance with this, Rechar and Rodgers (2001:199) pointed out some roles that a teacher should play in cooperative learning.

*The teacher has to create a highly structured and well-organized learning environment in the classroom setting goals, planning and structuring tasks, establishing the physical arrangement of classroom, assigning students to group and roles.*

Therefore, before beginning to plan cooperative lesson, training is crucial for the success of the program in any classroom (Johnson, Johnson and smith, 1991). Training will help teachers learn about ways to implement the technique as well as the benefit and disadvantage of using it. These trainings could come in the form of workshops, seminars etc. but it is essential that they are hands- on in nature and teachers should be given the opportunity to practice what they will be asking students to do (Solomon, 2006).

However, about 75% of interviewed teachers did not take training on cooperative learning.

*I did not take short or long-term training on this method. In my stay at college also instructors rush for course coverage. Therefore, they do not have a time to apply this method.*

(Lema, March 25, 2010)

According to Good and Brophy (1987), teachers should be aware of much of their classroom behavior. Otherwise, they cannot do effective work. There are different teaching methods that require skill of teacher to involve students in learning. In order for these powerful methods to be utilized effectively in the classroom, the teacher must have actually learned some mathematics by these techniques himself (Jecks and Penc, 1968). To organize cooperative task, motivate students and getting them executed about cooperative learning; before teachers can communicate excitement, they also must be excited. This means they must personally experience the thrill of working in-group. With this kind of experience, the teacher will be more effective in fostering a dynamic learning atmosphere in his cooperative classroom. Yesuf stated how his Differential teachers' experience helped him to try cooperative learning in classroom.

*When I was in college, I remember the teacher who taught us differential. Most of the time he gives us group work and monitor us effectively until we complete the discussion and present it.*

(Yesuf, March 11, 2010)

Yesuf, believes that the experience that teachers obtain when they were students is essential to their latter teaching profession. He stated that the only teacher who practices cooperative learning in the school is he. The reason for this is he considers his Differential teacher as a model. As I observed his classroom repeatedly, even if he tried to implement cooperative learning better

than other teachers do, the classroom organization for the targeted task was not as such satisfactory.

Of course, organizing classroom for cooperative learning is not easy. There are different potential problems. Some students do not want to work with certain other students. They may look down other students. In such a case, other students complain about not working with this particular student. For instance, Hirut, one of the student informants explained her opinion like this:

*Some students take control and do not allow others to share their knowledge. In the group, they are full of dominating. Since they look down you, your idea can be shut out of the discussion and completely ignored.*

(Hirut, March 16, 2010)

Dominating personality could interfere with each individual chance to participate in the classroom. When there is a dominant person, others do not learn how and why things are done, but only copy the information. At this time the ignored students frustrated and are not interested to join as member of this student. Because he acts too much as a leader and not involve the other group members in decisions and just run the activity in his/her own way.

On the other hand, many hard working students do not like working in group because they feel they do all of the work, while others take advantage of them and they all get the same good grade. Since some group members may not contribute to the activity, one or two students end up doing all the work. These students did not care about the assignment that takes advantage of the group member who did care and who did the work. This is also disappointing for those who want to do. With regard to this, one student informant stated that:

*If you are the only one in your group who is willing to do the work and the rest of group members just sit back and watch, it can get very frustrating. If you try to give them things to do and help them get involved in the group, their lack of motivation and care may produce poor quality work that may result in low mark.*

(Mebrat, March 24, 2010)

Working with others can get annoying if someone has a free loafer or someone who does not care about doing accurate work. This situation creates disagreement between students and paves a way to ignore each other. Whether the students who are not cooperative and do not share their part for the team or who take over the group and dictate what every one does, are difficult for the teacher. At this time, the teacher must analyze and make his best professional judgment to determine these types of students to work as team members.

The above challenges are the result of lack of awareness of students to cooperative learning. According to Johnson, Johnson, and Smith (1991), teachers avoid these challenges by explaining to the students what cooperative learning is, why he or she chosen to use it in his/her classroom, and the results typically found from using it. Doing this, make it easy to form effective group if the students aware about the benefit of working cooperatively.

Inline with this, the FGD result indicated that teachers are failed to specify clearly academics and social benefits of cooperative learning. According to the respondent students the main purpose of using group work or group assignment is to improve the grade of the students that goes down because of difficult tests.

*Our teachers give us group work or group assignment and informed us to do it well in order to maximize our mark. Most of the time, such types of tasks are given when the students achieved low score in tests or examination.*

(FGD, March 19, 2010)

Of course, the target of cooperative learning is to produce greater students' achievement. However, it is not the only target. It is the learning that resulted in more higher level reasoning, more frequent generation of new ideas and solutions (i.e. process gain), and greater transfer of what is learned with in one situation to another (i.e. group to individual transfer) (Johnson, Johnson and Smith,1991). Therefore, teachers must aware their students multi directional advantage of this method. Otherwise, if students only mark oriented, their main target becomes only to gain highest score. They missed the significant benefits of the method and rushed for achieving the targeted mark. This unlimited need of gaining high mark may be lead them to be dependent of academically good students and copy down the result without knowing its process. Having this in mind one of the informant students argued that such types of activities may create the opportunity of scoring high mark but does not help them to grasp the intended knowledge. He continued his idea saying:

*When group works or assignments are given not everyone in the group participates, only hard working students do all of the work and other students come to write down their name on the result. They receive the same score with the students who did all of the work, but miss the knowledge that they should get from the activity.*

(Mebrat, March 24, 2010)

The interview revealed that instead of working together these students have just copied answers and never understood the concept of problems which they were working on. They rely on others to do the work for them and to score grade. Such types of student are punishing themselves by not learning what they should learn from the material. They also hurt others in the group because they have one less person thinking about the problems.

Therefore, teachers have to draw the clear image of cooperative learning in students mind. To acquire more advantage from it, cooperative learning should be the appropriate choice and will for the students (Johnson, Johnson and Smith, 1991). This will and choice can be developed through the structured teachers' ability of specifying instructional objective, determining group sizes and assigning students to groups, arranging room, planning instructional materials to promote interdependence, assigning groups and task, structuring positive interdependence and accountability, and specifying desired behavior.

Researches indicated that, positive interdependence exists when students perceive that they are linked with group mates in such a way that they cannot succeed unless their group mates do and that they coordinate their efforts with the effort of their group mates to complete a task (Thousand et.al, 1994). This means the group has a clear task or goal so everyone knows they sink or swim together (Davidson, 1990). At this time, the effort of each person benefits not only that individual, but also everyone else in the group. The main problem that raised by the interviewed teachers is the absence of the situation in which the students see that their group mates work benefits for them. According to teacher respondents, the interest of students to work together in small group to improve the learning of all members by sharing their resources to provide mutual support is negligible. Abera, one of teacher participants, expressed his idea like this:

*Totally, students do not need to work cooperatively. Both high achievers and low achievers are frustrated when asked to work tasks in-group. High achievers complain low achievers due to their lack of motivation and low achievers complain high achievers for their behavior of dominancy in the group.*

(Abera, March 17, 2010)

This lack of trust to each other resulted in poor cooperative skill during completing the task that needs support of each other. It is also true for student informants. They know that cooperative learning group has a great advantage. It is practiced rarely in their classroom. However, its implementation is not as satisfactory as it is intended. Regarding with this, the focused group informants said the following in describing an undesirable situation about the implementation of cooperative learning.

*It is advantageous for us. If we invested our time on it and exercise our role, we can learn more from each other. Nevertheless, there is a great problem between group members. Academically good students do not trust on share of other students. Similarly lower students afraid to share their idea. So most of the time it seems a group of one teacher and three or four students involved in it - the teacher is speaking continuously and the students listening passively.*

(FGD, March 12, 2010)

The above discussion indicated there is lack of common goals, being dependent on each other's resources, assigning specific roles to each members or division of labor. As proved by FGD admitting some group members dominating group interaction addresses that students relying on one another for mutual achievement is not much.

According to Johnson and Johnson (1990), positive interdependence has an effect on the interaction pattern among students. Because, face – to face interaction exists when students only interact with one another the ways and procedures of dealing with the task and sharing idea to learn from one another.

The description of classroom observation and the responses given in the interview by both teachers and students reflected most of the students do not care about each other's learning. Lemma, teacher participant, said the following describing students' lack of interest to do activities cooperatively.

*While group discussion is going on, their interest is extremely low to listen each other or to express their opinion. When I circulate in the classroom, some of them try to solve the given problem individually, others ignore themselves from the group and do their private task, others sit ideal without doing anything.*

(Lemma, March 25, 2010)

It is clear that, frequent face-to-face interaction is practiced when students listen to each other and engaged in the activities supporting and encouraging one another. Otherwise, the classroom that consists group of students who do their individual work, who are day dreaming and who ignored goal of cooperative learning and immersed in individualistic learning, can not fulfill the purpose of cooperative learning.

The purpose of cooperative learning group is to make each members a stronger individual in his or her own right (Thousand et,al 1994). To ensure that each student is individually accountable to do his/her fair share of the group's work, teachers need to assess how much effort each member is contributing to the group's work, provide feedback to groups and individual students, and ensure that every member is responsible of the final out come.

If teachers had frequently ensured that each students was assessed and used feedback mechanism that could determine the level of each students learning, they could have made their students feel responsible to do the assigned task and participate equally to accomplish the task. Teachers should be wise to identify their student behavior. Some students are active and can freely talk in the classroom. Others prefer keeping silent even if they know about the material. Such types of students need to be initiated by the teacher.

For example, teachers can examine students by calling one of them randomly to present his/her group's work to the group or to the entire class. If they do this, students expected that they will be called for the next time and try to take part in the given activity. The results obtained from classroom observation as well as students interview found out lack of proper handling of individual accountability by teaches. In one of the class that I observed, the students called the teacher repeatedly to ask question. However, I have never seen when the teacher asks to check whether the students engaged in the given task or not. The students' interview also revealed that less commitment of teachers to insure individual accountability. Bekele, participant student, with regard to this said:

*After assigning the task, he moves in the class to help us. We ask him when we faced difficulties of solving the problem. Moreover, he helps us by showing how to solve the problem.*

(Bekele, March 8, 2010))

This is the same as what I observed. The teacher round in the classroom observing each group. Not for monitoring behavior, or assisting with needs, or intervening if needed, but to solve the given problem for the group. He acts as one of the active group member. However, this is not the role of teacher when cooperative learning is going on in the classroom. His role should be pushing the students to arrive at solution with their effort. This implies teachers are enabling to develop sense of individual accountability in their students.

There is a pattern to classroom learning. First, students learn knowledge, skills, strategies, or procedures in cooperative group. Second, students apply knowledge or perform the skill, strategy or procedure alone to determine their personal mastery of the material. Students learn it together and then perform it alone (Thousand et, al, 1994).

Learning together requires cooperative skill. This cooperative skill is ensured in getting to know and trust each other, communicating accurately and unambiguously, accepting and supporting each other (Johnson and Johnson, 1991). The classroom situation totally contradicts the above arguments. Many students have never been required to collaborate in learning situation, therefore, lack the needed social skills for doing so. They do not want to play the role that is expected from them; cooperative skills such as leadership, decision-making, and trust building communication skill were not seen during classroom observation. Students who become group leaders were those who are better than others are. Hanna, student participant, also indicated this during the interview.

*The same students were assigned every time when groups were formed for discussion session. These one were usually lead the discussion and called upon to report students' idea in their groups.*

(Hanna, March 12, 2010)

This shows that, students being dependent on active students and those active students might have contributed to most of the students to not practicing the communication and group skills that were important for the effectiveness of classroom interaction. As I understood, the problem is the students do not have information about the process of cooperative learning.

Making students to form group and telling them to do the tasks may not create cooperation among students in the absence of informing them the proper skills they should employ in the whole process of cooperative learning. In general,

the results suggest that students are forced to be involved without being informed what roles they have to play in cooperative learning classes and teachers are expected to lead the process without giving the necessary materials and guidance.

According to Stockyard and Mayberry (1992), not all groups are cooperative groups. Putting groups together in a room does not mean cooperative learning is taking place. In order to have cooperative learning positive interdependence, face-to-face interaction, individual accountability and cooperative skill should be observed in behavior of students.

However, the result of the study indicated that the above basic elements of cooperative learning are completely absent due to poor management of teachers, lack of interactive experience, the dominating behavior of some students and absence of motivation that is seen in lower achievers.

#### **4.5. Factors that Influences Students' Classroom**

##### **Interaction in Mathematics Classes**

Even though students were sometimes placed in different arrangements to interact among themselves and their teachers, they were not able to do interactive tasks actively due to different reasons. These reasons may be related to teachers, students and schools or classrooms that have their own influence on students' classroom interaction.

##### **4.5.1. Factors Related To Teachers**

Teaching mathematics requires knowledge of mathematics, students, teaching and the opportunities to apply this knowledge in varied setting and situation (NRC, 2000). To help students learn better and develop their mathematical power, teachers need to know mathematics and how to teach it. They must know how students learn, analyze issues in mathematics teaching, and use new materials and technology. In relation to this, Solomon (2006) states that, the foundation for mathematics teaching is laid during pre-service education.

This is the period, in which teachers can develop their own teaching skills and mathematical knowledge through out their career. Therefore, to get students excited about mathematics and help them to learn to think mathematics is useful for themselves, the way teachers trained to teach mathematics played the great role (Jenks & Penk, 1969).

When we come to the real situation of our country, despite the Ethiopian Education and Training Policy strongly criticizes the conventional teacher based approach in education, the teaching learning process in most Teachers' Education College has persisted to be teacher dominated, so the current teacher's methodology does not foster students' participation in classroom.

According to the interview conducted with teachers, they are not trained in a way to facilitate groups, use brain washing techniques, or facilitating conflict management. Instead, they are trained to be good classroom managers with orderly students quietly listening to their lectures or doing their work individually. Many teachers do not know how or where to start using different techniques that promotes interaction in their classroom. The reason is that, they did not practice working socially when they were in College. Regarding this one of the teacher indicated.

*I do not remember the time when our instructors used different techniques that need our involvement. They write on the board many definitions of facts, theorems, and solved problems. Then, we will copy it in our exercise book and study it for examination.*

(Lemma, March 25, 2010)

Most classes in Teachers' Education College are characterized by a situation where students are made to listening their instructors and copy notes from the black board. Therefore, teachers reflect the teaching style of their instructors. Lecturing is the choice of most of the teachers that were observed. It seems

that the influences of learning method that they passed away when they were students attracted them to implement it in their teaching style.

For instance, one of the participant teachers argued that, the teaching style he employed might be the influence of the way he was trained. This teacher elaborated this situation saying:

*Starting from primary schools up to college or university the most preferred teaching method of teachers was lecture. All of us passed through this method. Now, we also practice the same method. This may be the result of the way we trained.*

(Yesuf, March 11, 2010)

According to Yesuf, since at College or University level the preferred pedagogy is the lecture, teachers are not trained to help their students to involve in the development of class procedures and assessments. Their previous learning experience affect current thinking and practice of interactive activities in the classroom. In line with this Pantize (1996) argued, if teachers are thought by the lecture method while in their schooling, then it is hardly surprising that this will be the method of choice when their turn arrives to take over the classroom. This is resulted in ignoring different techniques that give students opportunity of actively involving in mathematics and favoring in conventional method (lecture method).

According to the teacher respondents, the main reason for using lecture method is not only lack of training to apply different techniques but also fear of loss of content coverage. They fear a loss in content when they used different cooperative methods because group interaction often takes longer time than simple lecture. Students need time to accumulate enough information in order to be able to use it with in their groups. Teachers reasoned why they used lecture method as follows.

*When I lecture, I get the feeling that the content is being covered because it has been presented to the students in an orderly fashion. Giving students group work or other form of cooperative learning need time to work together to reach a consensus and formulate opinions for presentation to the whole class. This needs to give more responsibility to the students for their learning. In this line, I do not think that they grasp required outcome and it is difficult to cover the content intended.*

(Abera, March 17, 2010)

Many teachers provide lecture notes not only an attempt to guarantee content coverage but also they think many students do not understand the material despite excellent presentation by the teacher. This is also true for most of the students. Worku, the student participant, said the following why he preferred teacher directed teaching.

*In my turn, I prefer teacher directed teaching method. Because, he is the teacher, who prepares questions for examination. He gives us well-organized lectures related to the examination. Therefore, I prepare myself for the examination reading the teacher's lecture. However, trying to search knowledge from group mates who are themselves searching the same knowledge is very difficult.*

(Worku, March 18, 2010)

Both teachers and students concluded that the situation would be even worse if students work with other students who may be having similar problems. However, different researchers do not accept it. For those researchers the reality is this, when students become involved in their learning their

performance rises (Davidson, 1990, Johnson, Johnson and Smith, 1991, Johnson and Johnson, 1990; Good and Brophy, 1987).

From the above discussion, we can infer that, the main reason for developing the mentioned ideas is teachers receive little or no training in making classroom interactive they are unaccustomed to what takes places in interactive learning classroom. One challenge is this that they find it hard to believe that students can be learning the content material while they are socializing in their groups. This is the result of lack of awareness of teachers to facilitate effective learning atmosphere to promote students interaction with their teachers or with themselves.

The other factor that hinders students' classroom interaction is teachers' unfair treatment of students. Concerning teachers' role in motivating the students in participating to do interactive activity, the classroom observation revealed that teachers attracted to talkative students. Teachers in the observed sections were seen to marginalize those students whose performance was relatively weak.

Similarly, students proved this unfair treatment of teachers inhibited them from participating in classroom activities that need their involvement. During the focused group discussion, the participant students expressed their dissatisfaction on the treatment of teachers saying:

*Teachers focused on active students than encouraging all of the students to participate equally. They asked questions some students that they thought would react to their questions in classroom discussion or other similar tasks, teachers ignore academically weak students and run only with active students.*

(FGD, March 19, 2010)

As indicated by Lason (1979) cited in Brophy and Good (1987) this gives advantage to those who are active to be more active. On the other hand, weak students were marginalized than encouraged to participate.

Thus, it can be said that most of the teachers did not provide equal chance of participation for all students. This problem of teachers' different treatment toward individual students seemed to be reflected in giving feedback for their performance. This could result in discouraging those students whose performance is thought to be weak from participation.

#### **4.5.2. Factors Related to Students**

Classroom interaction in the side of students requires individual commitment, interest, motivation, experience and belief that force students to practice tasks actively. In other words, classroom interaction among the students needs facilities that related to different variables.

Regarding this aspect Rosemay (1995:3) mentions the favorable facts as follows:

*Properties of good classroom including a feeling of warmth, mutual support an absence of fear, a safe environment, group solidarity, a feel of comfort, mutual aspect, people mindful of other people's abilities and limitation, a feeling of cooperation, a felling of relaxation, a feeling of trust, unit with the classes, the class come together.*

This reflects that classroom discussion among the students strongly needs facilities that make interaction attractive, practical and simpler. The absence of these conditions may limit students' classroom interaction in mathematics classes. From the result of interview, it seems reasonable to state that fear of making mistakes; lack of belief in their mutual learning, peer pressure and lack of interest to the subject were the strongest responsible factor to affect students' mutual discussion in mathematics classes. Regarding this, one of

the student mentioned fear and lack of confidence have a great influence in students' involvement. Further, he said:

*Most of us are not willing to engage in classroom activities. They are very small students who involve in interactive activities. Most of us afraid of speaking in front of our friends.*

(Worku, March 18, 2010)

Many students hate social interaction they receive while engaging in cooperative learning, because they are concerned that they will be embraced. Low performing students in particular often try to hide their academic deficiencies. When placed in-group work setting, these students are often unable to prevent their peers from seeing just how much they are struggling. This can cause the students to shut of or disengage from learning cooperatively.

According to Brophy (1995), this behavior may result from specific experience of environmental causes. Some students have not developed effective conversational skills because their parents seldom converse with them or respond positively to their verbal initiations and they have not much opportunity to interact with peer. Hirut shared this idea and explained the reason of her fear like this:

*I think the cause is the way in which our parents treated us in home. They did not allow us to speak in front of our elders.*

(Hirut, March 18, 2010)

Due to lack of opportunity to speak in front of others in their living area or at their homes, they never had the practice of talking freely in front of their friends. Hence, it is resulted in not paying due attention to the classroom interaction.

Researchers showed that socio-cultural factors from which students have come might have strong influence on their attitude during classroom interaction (Alamrew, 1995). He assumed that most secondary school students are affected by their socio-cultural norms since their parents restrict them from most social interaction at home. Furthermore, Alamrew stated that parents in some nationalities restrict their children from speaking in front of their elders. This could have negative impact on learners' attitude during group interaction in classroom.

When teachers were asked to forward their opinion about the influence of socio-cultural factors on learners' verbal performance, one of the respondents said;

*Most students grew up within strict families that undermine or do not allow children to take part in discussion about family affairs. Therefore, this may influence children to be quite or silent in any interaction practices. Moreover, this could have a negative effect on their verbal behavior in classroom participation*

(Tolosa, March 11, 2010)

All the results discussed so far may imply that majority of students' participation has strong relation to their cultural and to the way they grew up in the family. Hence, it could be deduced that socio cultural factors are some of the major factors that affect learners' participation.

The other factor that inhibits students from involving in classroom interaction as mentioned by teachers is students past learning experience. According to those teachers, students developed independent study habit and are strongly oriented toward their personal achievement. Therefore, students who have never worked in collaborative learning groups gets difficulties to practice such skills as active and tolerant, listening, helping one another in mastering

content, giving and receiving constructive criticism and managing disagreements (Fiechtiner and Davis 1992 cited in Davis, 2002).

All the interviewed teachers noticed that students lack of experience affect their participation in activities that need their engagement. Concerning this one of the respondent teachers described the following:

*Their prior knowledge to engage in different activities is very poor. Most of them expect more from the teachers. Hence, learning by self-exploration is considered as wastage of time in the mind of these learners.*

(Lemma, March 25, 2010)

Coming from an educational background where interaction with peers or learning through discussion almost did not exist makes students to sit in the classroom without participating. In line with this, Cooper and Associates (1990) explained that, based on their past experience with school many students perceived that they are in competition with the classmates and students may also opposed participation. This is because their education has been based on individual effort and they may feel uncomfortable helping others or seeking help. This shows that the majority of students were accustomed to the individualistic or competitive learning method than cooperative learning method when they were in primary and junior schools. Furthermore, both teachers and students explained that the image that is given to mathematics by students has the great influence on their mathematics participation. According to the respondents, the image that students have to mathematics is very poor. They perceive it as a difficult subject and trying to do it as wasting of time. For this reason, they give most of their time to the subjects to which they are benefited more by spending minimum time on it. Related to this one of the students gave her ideas like this;

*I know that mathematics is hard subject for me. So, why do I spend my time on it? Instead of spending my effort and time to the subject that I didn't understand it, why don't I spend my time to the subjects which I get more benefit with little effort and time?*

(Hirut, March 16, 2010)

Since a widespread conception that students' attitude toward mathematics is largely negative, they are not being able to do even simple mathematics (MOE, 2009). Many students image of mathematics represent mathematics negatively, such that it is perceived to be difficult, could abstract and in many cultures, largely masculine (Ernest, 1996 cited in Sam, 2002). Similar result also obtained from the interview of teachers. Concerning interest of students toward mathematics learning, one of teacher participants expressed his idea like this:

*Students do not have positive attitude toward mathematics. They perceived it as a subject that cannot be touched. Therefore, they do not have any interest even to do simple computation.*

(Abera, March 17, 2010)

This, the worst image of mathematics that is perceived as a difficult subject to learn, resulted in the increased problem to low performance in mathematics and poor attitude to it.

From the above discussions, it is possible to infer that lack of confidence to explain their idea, feeling of embarrassed, lack of speaking experience in front of people, lack of interest in the interactive activities as well as the subject, lack of knowledge in the particular topic, and lack of motivation inhibited students from participating in the activities that need their involvement.

### 4.5.3. Factors Related to Classroom

A number of scholars have confirmed that physical environment, arrangement of furniture, classroom appearance and layout etc contribute a lot to promote effective learning in general and the implementation of active classroom participation in particular. In a classroom characterized by active involvement of students including frequent use of group work, movement of students to areas, the use of resource center and independent work etc, the sitting arrangement will almost certainly requires desks to be grouped together and the use of activities in specific areas. The traditional formal arrangement which is arranged in the layout of front back system encourages one way communication and also discourages students working in group. In connection with this, the finding in this study revealed that teachers ranked traditional arrangement of furniture is the main reason for poor classroom condition that affect the real implementation of interactive activities. Stating this problem one of the teacher said:

*Seats are not suitable for group interaction because of their arrangement. Students cannot sit face to face for group discussion. The furniture's did not suit for teachers to form appropriate group size and group composition.*

(Lemma, March, 25, 2010)

The above discussion shows the traditional type of seating arrangement that students sit by facing the back of their friends and facing to the teacher and the blackboard limits students' interaction during the lesson. According to Anderson (1989), one essential condition to be fulfilled is that chairs and tables should be light and moveable and the sitting arrangement is in cluster of desks or round a table rather than in rows. This requirement is totally missing in two secondary schools from the observed three schools. In these

two secondary schools, the sitting arrangement of students is very traditional which are fixed to one particular position.

The other factor that is related with classroom condition is large number of students in the classroom. Regarding the numbers of students, Amare (1992) explained that over crowded classroom is one of the critical problems of education in Ethiopian context. Such problem negatively affect students participation, teachers follow up feedback in the classroom and teacher student communication. Nearly all of the observed classrooms consist below fifty students. Therefore the number of students is not the problem that inhibits classroom interaction.

However, some of the teachers complain that, the size of the classrooms was very small and they were built to consist not more than forty students. According to these teachers, since the number of students in each classroom is around fifty, the classrooms are crowded and difficult to round between the students. Regarding this, Tolosa, teacher participant explains as follows:

*The classrooms were made in order to include forty students. But, as you observed there are nearly fifty students in one classroom. This situation creates crowdedness and it is difficult to move between students to support them in order to engage in different activities.*

(Tolosa, March 11, 2010)

From the above discussion one can understand, even if the number of students is not more than fifty, un proportionality of the class size and number of students limits teachers from controlling and supporting students to participate in different activities.

In general the existence of different hindering features related with in convenient seating arrangement is the reason why teachers unable to

implement some strategies that made student active participant in mathematics classes.

From the above discussions, lack of teachers training on cooperative learning that is resulted in lack of awareness of teachers to facilitate effective learning atmosphere to promote interactive learning, teachers' overuse of his/her authority because of fear of loss in control over content coverage, and unfair treatment of teachers are some of factors that restrained students form classroom interaction.

Furthermore, peer pressure, wrong belief toward working together that is developed in students' mind, fear of making mistakes, lack of motivation, shortage of time that is given during group discussion and questioning and answering, lack of interest, having poor background or experience and uncomfortable seat are responsible factors that affect students' classroom interaction.

## **CHAPTER FIVE**

### **Summary, Conclusions and Recommendations**

#### **5.1. Summary**

The main purpose of this study was to investigate the extent of students' classroom interaction in mathematics class and to find out the major factors that influence students' classroom interaction. Accordingly, the research questions related with the issues such as nature of students' classroom interaction, students classroom participation, culture and practice of students in working cooperatively and factors influencing the above activities in mathematics classrooms.

To answer these questions, a qualitative case study method was applied to collect data from teachers and students through classroom observation, interview and focused group discussion. In order to collect data on the topic teachers were selected randomly and students were selected purposefully. The data collected through the above tools were analyzed and interpreted qualitatively. Hence, based on the review of literature and analysis of the data the following findings were obtained

##### **5.1.1. The Situation of Classroom Social Interaction**

Teachers' classroom behavior can encourage or discourage classroom interaction. Teachers who love their students, treat their mistakes in appropriate way, give them freedom and responsibility, and trust them and help them to develop confidence, create conducive classroom atmosphere and encourage classroom interaction, where as, teachers who do not respect their students, criticizes each and every activity of the students, create undesirable classroom atmosphere and discourage students' classroom interaction.

The study also revealed that teachers tried to use questions particularity at the beginning, at the end and some times at the middle of class time. However,

these questions did not promote students interaction. The time given for asking students was not more than five minutes. About thirty-five minutes of the class time is dominated by teachers. The main reasons that raised by teachers for monopolizing nearly all of the class time are the excessiveness of the teaching materials and less interest of students to involve in interactive activities due to their lack of communication experience in lower grades and the negative attitude that students show to mathematic. Therefore, teachers are active classroom actors and students are passive receivers.

### **5.1.2. Students Classroom Participation**

Teachers tried to initiate students to participate in the classroom by grading their participation. However, there was a little participation seen during classroom observation. The reason for this situation is students do not have awareness about the contribution of their participation to maximize their learning and the behavior required for participation. Therefore, most of the students left all classroom interactive activities to three or four active students. For this reason, those students dominate class participation. Those few students were seen raising their hands repeatedly to ask or answer questions. Teachers also attracted by them and gave a chance of answering all questions. This unfair treatment of teachers benefited active students to be more active and push passive students to be more passive.

Furthermore, the time that was given to think to the asked questions or for classroom discussion is very minimum. Instead of giving little more time to think about the questions, teachers just let the fastest students answer for everyone. Academically low or shy students faced problems to compete with active students to involve in classroom participation.

### **5.1.3. Cooperative Learning in Mathematics Classes**

In the observed schools, mathematics teachers rarely practiced cooperative learning. However, the students' interest to do activities cooperatively is very low. This study revealed that higher achievers neglect medium or low achiever

from cooperating with them due to their absence of motivation to involve in-group activities and to share their parts. On the other hand lower achievers too do not need to do with higher achievers due to they are looked down and undermined by those students. Therefore, the students do not need to support each other and they prefer individual work rather than cooperating with each other to achieve common goal. This is resulted from teachers poor organization of cooperative learning and the inability of giving awareness to students the way in which this method is implemented and its contribution to increase their learning.

Generally, teachers did not try to develop the interest and attitude of doing together to their students. Because, teachers themselves have not the skill of doing together with their classmates when they were in schools as well as in colleges or universities.

#### **5.1.4. Factors that Influence Students Classroom Interaction**

The study showed there are different factors that affect students' classroom interaction. The first factor is related to teachers. Teachers prefer to conventional teaching method that is making students passive receivers than employing different techniques that need students' participation. The reasons of these teachers to choose lecture method are the loss of control over content coverage and lack of confidence to trust students to give them responsibility of their learning.

Unfair treatment that teachers give to students in favor of active students ignoring passive students is the other teacher related factor revealed by the study.

The second factor is related to students. Students fear to speak in front of their teachers and their friends. This is the result of improper handling of their families at home and lack of exposure to speak in front of people in their home, or village, or in lower grades. The study also pointed out that students

developed negative attitude toward mathematics and this attitude inhibits them from initiating to the activities that require their involvement.

The third factor is related to classroom conditions. The traditional arrangement of students sitting is other factor that limits students' classroom interaction. However, large number of students that is suggested by different researchers did not affect students' interaction in the targeted schools. Because all of the classrooms that were observed consists less than fifty students.

## **5.2. Conclusion**

Based on the findings the following conclusions were made

- It was accepted by students that warm and friendly teacher encouraged them to participate on the other hand; teachers' different treatment mattered to most of the students. That is, teachers' relation with only active students discouraged these who were shy and low in their performance.
- One factor, which may have discouraged cooperation, was students' earlier experience in interactive learning had been rare for them both at primary and junior levels. When they asked to do cooperatively at secondary school level, they resist the change.
- Students' participation in general is limited by the teachers' way of teaching. That is as teachers mainly used lecture method, classrooms are mostly teacher dominated. Thus, students supposed to listened to their teacher's talk rather than interacting actively.
- Teachers usually skip cooperation task due to students' incapability and shortage of time. In addition, whenever teachers used such activities most students do not show interest and willingness.
- Teaches do not have good knowledge about cooperative learning. If they them selves have had little experience of communicative teaching techniques, it is difficult to expect teachers to transform their classrooms.

- Lack of motivation is found to have negative impact on the students' participation in the classroom. That is, due to negative image of mathematics that was developed in students, they have no interest to do mathematics and to engage in interactive activities.
- The classroom environment was the other constraints for the students' low participation in the class. That is the fixed seats arrangement and the limited time given for the lesson were the other factors that created problems in implementing interactive tasks

### **5.3. Recommendation**

The finding of this study suggests the importance of seeking and obtaining solutions that could minimize the problems identified in the present study. The following suggestions will be useful as stepping stone for seeking solutions for such problems.

- Teachers should be aware that friendly approach plays a great role in the students' interaction. Therefore, teachers should try to approach their students in a friendly manner.
- Teachers should make efforts by encouraging shy students and whose speaking experience is low to speak in front of their classmates.
- Teachers, principals and other concerned bodies should provide to give sufficient exposure to learners at lower level to practice communicative or interactive learning to build good background for the higher level.
- Teachers' education program should pay due attention to the teacher trainees in dealing with a variety of classroom interactive activities which have the important aspects for developing students participation.
- Teachers and students should be conscious of time in their activities in classroom events to minimize time constraints in completing tasks.
- Teachers were constrained different factors that are related with the schools existing situation for implementing interactive learning. Therefore

schools and woreda or zone educational bureau should facilitate classroom seating and time allotment that suit the requirement of classroom interaction.

- Teachers and parents should try to develop the interest of mathematics learning in their students discussing its application in daily life and the use of mathematics in different science and technology.

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## **Appendix A**

### **Researcher Ethical Principles**

- The information you share with me will be kept secured in order to your personal identity kept anonymous.
- Pseudonyms will be used in cases names are needed in the report.
- Participation in the research is voluntarily; you have the right to withdraw from the research at any time.
- Information given to me will be treated as belonging to you; and it can be used only with your permission.
- I will seek your permission to use tape recorder.
- You have the right to refuse and change your idea.

Thank you-The Researcher

## **Appendix-B**

### **Interview guide for teachers**

Name

Sex

Teaching experience

Qualification

#### **Main Interview Guide**

1. What are the methods that you use to present your lesson?
2. To what extent the teaching methods that you used initiate your students to classroom interaction?
3. How do you encourage your students to participate in your classroom?
4. To what extent cooperative working culture is practiced in your classroom?
5. How do you follow up and evaluate each student's participation during group work?
6. How is your students' effort to express their idea without any fear or problem?
7. How is the students' interest to participate in the classroom and work cooperatively with their friends?
8. How do you handle students who prefer not to work cooperatively?
9. What are the major problems that you face during interactive activities?
- 10 How these problems can be minimized do you think?

## **Appendix-C**

### **Interview Guide for Students**

1. To what extent do you interact with your teacher and partners in mathematics class?
2. To what extent your mathematics teacher provides the situation that helps you to actively participate in your mathematics learning?
3. What is your teachers' treatment to encourage you to participate in your mathematics learning?
4. To what extent cooperative work culture is practiced in your mathematics classroom?
5. What is your interest toward group work, cooperative learning and other activities that need your involvement?
6. What are the major problems that you face during interactive activities?

## ***Declaration***

I confirm that this thesis is my original work.

Name Teshome Tessema

Signature \_\_\_\_\_

Date of Submission 14/06/2010

This thesis has been submitted for examination by my approvals as a university advisor.

Name Solomon Areaya (Dr.)

Signature \_\_\_\_\_

Date of Submission \_\_\_\_\_