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SOCIAL INTERACTION IN MATHEMATICS CLASSROOM: A CASE STUDY OF CITY SECONDARY SCHOOL

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ANDUALEM MELESSE

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Social Interaction in Mathematics Classroom: A Case Study of City Secondary School

A Thesis Submitted to the Graduate School of Addis Ababa University in Partial Fulfillment of the Requirements for the Degree of Master of Art in Curriculum and Instruction

By
Andualem Melesse

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Approved By Board of Examinations

Dsigaw Tasissa	July 17, 06	
Chairman, Department Graduate Committee	Date	Signature
Solomon Areaya	July 7, 06	
Advisor	Date	Signature
Dr. USHA DEVI P	July 7, 06	
Internal Examiner	Date	Signature
DESALEGN CHALCHISA	July 4, 06	
External Examiner	Date	Signature

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ABSTRACT

The purpose of this study was to understand the nature of mathematics classroom interaction. It also aimed to find out and examine factors that influence teacher-student and student-student interactions from the Social Constructivism and Symbolic Interactionsim perspectives.

Qualitative case study was used to carry out this study. Purposeful sampling was used to select eight students and one teacher from City Secondery School. Data were gathered using qualitative methods through personal observation, interviews, and field notes. The data were examined looking for common and distinctive ideas. Common issues were identified to form themes and interpretational analysis method was implemented in analyzing the data.

The finding revealed that the learning environment in City Secondary School is highly affected by the classroom social norms. Students were interacting with their teachers, as well as to their peer groups according to the constituted norm. Social norm of the classroom is a significant factor affecting their interaction. Besides, lack of confidence, being uncertain of the answer, fear of challenges, lack of enjoyments and lack of motivation are among many factors affecting classroom interaction. In the classroom, it was found out that students were using different methods to initiate their interactions. These methods include putting up their hands, getting up out of their seats, calling out the teacher's name, responding in group, shouting together, keeping silent, and murmuring and gesturing.

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List of Abbreviations

EGSECE----------Ethiopian General Secondary Education Certificate Examination

EHECE ----------Ethiopian Higher Education Entrance Certificate Examination

ETP----------Education and Training Policy

FGD ----------Focused Group Discussion.

FIAC ---------- Flanders interaction analysis category

NCI ----------Nature of classroom interaction

TGE ----------Transitional Government of Ethiopia

TVET----------Technical Vocational Educational Training

ZDP----------Zone of Proximal Development

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

Today with rapid growth of technology, industry, agriculture, science also in other diversified fields, education is at the core of advancement. The importance of education in the socio-economic development of any country is unquestionable. Furthermore, education is a key ingredient for effective development strategy that enables individuals and society to make all-rounded participation in the process. The purpose of education is to enable humans to control and manipulate nature as they see fit in order to further their self-interest (Bacon as cited in Elleni, 1996:82).

Regarding the role of education in the development of an individual and in wider sense for society, the Ethiopian Education and Training Policy (ETP), For instance, has the following to stipulate:

> *Education enables man to identify harmful traditions and replace them by useful ones. And it helps man to improve, change as well as develop and conserve his environment for the purpose of an all-rounded development by diffusing science and technology into the society (TGE, 1994: 1).*

Education undoubtedly plays great role in developing individuals' capacity in problem-solving and environment-adaptability knowledge, ability, skill, and attitude (TGE, 1994:2). As a result, the individual is then able to participate in all -rounded development sectors.

Amertya Sen (1999) as cited in Amare (2005) that education in context of student development means extending the freedom of the students in learning. He added learning is something that comes from within the student and cannot be imposed unless learning takes place in the content of enjoyment (Sen, 1999, as cited Amare, 2005:1). Hence, freedom in learning is very important. According to Amare (2005), freedom is a means and end of education. He further argues that the human element is the most important entity in education.

> *A type of human development effort that ignores the human agency as autonomous being to decide its fate defeats its purpose. Education therefore should aim at expanding freedom through freedom. Expansion of freedom is viewed both as primary end and as a principal means of development (Amare, 2005:1)*

However, Freire (1972) argues that in banking system of education where the communication is one way, the student is alienated from his/her own learning and he further said the teacher is active while the student is passive. Therefore, he advised to use of dialogical pedagogy so that the students are emancipated from the oppressor (Freire, 1972:42).

In Dialog or Conversation, as Gadmer (2001) asserted, knowledge is not a fixed thing or commodity to be grasped. It is not something 'out there' waiting to be discovered. Rather, it is an aspect of a process. It arises out of interaction (Gademer, 2001 in Smith, 2001).

In a formal schooling system, the teaching-learning process does not operate in a vacuum rather in a school environment. And classrooms have the major role. Most of teaching and learning processes take place in classroom through interaction.

In this Study, the focus of interaction is on a sort of interaction taking place between and among students, teachers, and peers in the classroom which is commonly referred to as classroom interaction. Robinson defines interaction as

> *The process referring to "face to face" action It can be either verbal (channeled through written or spoken words) or non-verbal channeled through touch, proximity, eye contact, facial expression, and gestured (Robinson, 1994:7 as cited in Willson, 1999).*

Dewey (1938) argues that, education is based on the interaction of individuals' external and internal conditions. He further says that interaction and the situation during which one experience the world cannot be separated because the context of interaction is provided by the situation (Dewey 1938 cited in Vrasidas, 2000: 340).

Interaction is one of the most important components of any learning experience (Dewey, 1938: Vygotsky 1978 cited in Vrasidas, 2000: 340). The interaction, which takes place in the classroom, has great role in the overall teaching and learning process.

According to different educationalists, classrooms are extremely busy environment where the teacher interacts with her/his student and students also interact among themselves. Besides, the teacher might interact with a single student, with a group of students as well as with a class of students. Sometimes the interaction goes beyond the classroom. Jackson explains the interaction, which takes place in a classroom:

> *In a single classroom, teachers could find themselves engaging in more than thousand interpersonal exchanges with their students. These interactions between students and teachers are fundamental to the overall teaching*

and learning process (Jackson, 1968 cited in Delamont, 1983:50).

Regarding interactions, which take place in a classroom, a lot of research has been done. The research conducted some years back focused on the influence of the interaction between a teacher and students. Accordingly, one of the findings was that student–teacher interaction leads to cognitive development of students (Jones and Greig, 1994 cited in Willson, 1999).

Moreover, students' involvement in classroom discussions was deemed the major component of effective instruction. Hence, learning with others has multi dimensional benefits for students. Likewise, if students are engaged in classroom discussion, it has major impact on the overall teaching and learning process.

1.2 Statement of the Problem

As has been mentioned above, classroom interaction is a core activity that should take place in teaching-learning process. Both parties should contribute in the teaching- learning process. In other words, interaction is a joint action, which results from the articulation of the participating actors' activity. Here, while the teacher and the students interact, it should have meaning for both of them. As Yackel (2000) attests that the interaction in classroom is an action having meaning both for the person making them and the persons to whom the action is directed. Moreover, these actions are a series of events occurring in continuous manner.

With regard to the interaction in the classroom, I can cite an incidence from my own experience when I was a teacher in City Secondary School. One day, in one of my classes, the entire students unusually kept silent

while I was discussing the polynomial function. Their silence struck me and I asked them what was wrong. One of the students replied, "We were in the same manner for the last three days. And no one asked us why. We have kept silent - with no question, and no reply even though we know that it is crucial for our learning". Starting from that moment, I have been asking myself: "Do we, teachers, really care about our students besides teaching the solid subject matter? Do students have their interest on the teaching – learning process? How do we interact with them? " These questions grabbed my interest and pushed me to conduct a study on classroom interaction.

This means a lot for mathematics teachers for it implies that they need to be aware of how mathematical learning might be linked to social interaction. This explanatory, descriptive study was proposed to investigate the nature of mathematics classroom interaction in the School of City Secondary School in Addis Ababa.

This study focused on the nature of those interactions that occurred during regular mathematics classroom activities. In this context, the study sought to examine what factors influence student teacher and peer interaction in mathematics classrooms.

To deal with this research issue, the following guiding research questions have been formulated.

- *How is the nature of social interaction in Mathematics classroom at City Secondary School?*
- *What are the factors that influence classroom interaction in City Secondary School? How? And why?*

1.3 Purpose of the Study

Several pieces of research have been done in this area with their own purpose. According to Flanders the purpose of classroom interaction in the first place is to help the teacher develop and control teaching behavior, and the second is to investigate the relationship between classroom interaction and teaching acts so as to explain some of the validity in the chain of events (Flanders, 1970:2). Particularly, my study was proposed to understand the nature of mathematics classroom interaction. In this context the study sought to examine the factors that influence student's interaction with their teacher and peers in the mathematics classroom. It also aimed at finding out how the factors influence the teacher–student as well as student-student interaction. Specifically this study was proposed to identify the methods that student uses to initiate interactions; to identify the purpose of interaction in mathematics learning.

1.4 Significance of the Study

In analyzing the classroom interaction in City Secondary School, the findings may help the school in general and the teachers and students in particular to disclose the interaction between teacher and students in mathematics classroom. It has also a considerable contribution to improve the teaching – learning process; in particular, the interaction between the teachers and student.

As I have mentioned, there are some research pieces done regarding interaction in schools where boys and girls learn together. But this research is designed to study the NCI in the girls' school. Hence, it can be used as a standpoint for further studies in this field.

1.5 Historical Background of Classroom Interaction Analysis

Contemporary techniques of analyzing classroom interaction research can be traced back to thirties and mid fifties carried out by Blas and Withall , Lippitti and White, Andrson, and Lewin (Nelson, 1962, Delamont, 1983:16, McCoul, 1994:2).

Anderson's investigation of teacher-pupil behavior was the first systematic research concerning teaching leadership patterns and social climate of the classroom. In this research, social contacts were observed and clarified as dominative and integrative. (Nelson, 1969: 5)

Further, Nelson (1969) contended that Lippitt and White (1940) extended the sampling top to include four clubs of five-ten years old boy with three varied social atmospheres: "authoritarian", "democrative" and "laissez – faire". Later on, in Chicago in the late forties, Withall (1949) began exploring interaction analysis utilizing teacher verbal behavior as an index of the prevailing social climate within the classroom (Nelson, 1969:3).

As McCoul (1994) reveals there are many research pieces done in this area. But the best-known approach is Ned A. Flanders's Interaction Analysis Categories (FAIC) who developed in systematic observation technique for coding patterns as of teachers and pupils' verbal behavior (McCoul, 1994:2; Delamont 1983:17).

Flanders's Interaction Analysis is only part of wider tradition of studying classroom by coding the events using pre-specified categories. Using Flanders's Interaction Analysis Categories, a number of studies have been carried out. Some used totally Flanders categories and some tried to modify it. As McCoul (1994) states Delamont (1985) analogy of

classroom observation, of seventy-nine systems listed items, thirty percent were derived from Flanders's Interaction Analysis categories.

In studying classroom interaction, there are techniques set by researchers who study classroom interaction. And, as Flanders states, the techniques are based on perceived actions as a series of events, which occur one after the other (Flanders, 1970:1).

The central notion of the Interaction Analysis trends is freedom and control. According to Delamont (1983:17), teachers are assessed according to the limits they place on pupils' Freedom of speech. The more freedom the pupils have, the better the teacher scores.

1.6 Classroom Interaction Analysis Trends in Ethiopia

Regarding mathematics classroom interaction, I reviewed some research pieces, which have been carried out by Tassew (1992), McCoul (1994), Abdulaziz (1997), and Yeshimberat (1998). Most of them attempted to investigate the interaction pattern using the vast known Flanders's Interaction Analysis, which is called FIAC.

The aforementioned researches focused on investigating the freedom and control of the teacher on the learners. For instance, according to McCoul (1994) finding

> *Mathematics teachers played a dominant role in classroom discussion. Pupil talk was very restrained. It would appear that there is a need to allow pupil more freedom of expression if they are to develop a pattern of creative thinking (McCoul, 1994:51)*

In his study McCoul (1994) tries to show the teachers control over the learners. The other issue raised by most of the research done in our

country is gender. Regarding this issue, McCoul (1994) tried to show the boys' domination in classroom learning by saying that boys were dominant in all the classroom interaction than girls, especially in initiating teachers.

Tassew(1992) also found the periods to be limited to the question-response pattern and female teacher trainee students were direct in their influence than male. Yeshimberat(1998), on her side, concludes that region three teachers are gender-biased in their physics instruction during classroom interaction. Variations of teachers' praises or encouragement, accepting students feeling and teachers' response towards pupils feeling initiate giving directions and criticism towards boys and girls are significant during physics classroom interaction the magnitude of teacher interaction was high with males students compared to females.

However, as McCoul (1994) states, FIAC may not help researchers to see the overall events, which is going on in a certain classroom. He has mentioned the following limitations of the Flanders's Interaction Analysis Category.

- *It disregards the context in which the data are collected;*
- *It only pertains to observable behavior and ignores the purpose and intensity of behavior;*
- *It does not describe the totality of classroom life; only what can be categorized and measurable;*
- *Only verbal behavior is observed and non-verbal behavior ignored;*
- *There is an imbalance in number of categorized devoted to teacher talk and student talk; little attention is paid to student talk as seven*

categories are devoted to teacher talk and only two to student talk.

These, limitations enlightened me to use some other frame so that it could enable me to see the classroom interaction in a holistic manner. In this study, I used symbolic interactionism perspective as theoretical lens to understand the nature interaction. A symbolic interactionist framework focuses attention on how individuals interpret and give meaning to their experiences, to other people, and to "objects" in their lives and endeavors to understand how this process of interpretation leads to particular behaviors (Jacob, 1987 as cited in Thompson, 2000) and Social constructivism that view meaningful learning occurs when individuals are engaged in social activities.

Learning as a social process, it does not take place only within an individual, nor is it a passive development of behaviors that are shaped by external forces (McMahon, 1997). Rather it sees as crucial both the context in which learning occurs and the social contexts that learners bring to their learning environment (Gredler, 1997).

Besides, an attempt was made to conceptualize Teacher-Student behavior in classroom as social interaction. Social interaction is a process in which Teacher–Pupil behavior exists; that is, in order to say there is interaction, active participation of both parties is indispensable Yackel (2000).

CHAPTER TWO

REVIEW OF LITERATURE

2.1 Symbolic Interactionism

My theoretical framework arises from on my understanding of classroom interaction, which is based on the idea drawn from Symbolic interactionism (SI), or interactionism, is one of the major theoretical perspectives in sociology. This perspective has a long intellectual history, beginning with the German sociologist and economist, Max Weber (1864-1920) and the American philosopher, George H. Mead (1863-1931) (Yackel, 2000; Tatsis and Koleza (2000); McClelland, 2000).

Mead postulated two types of human interaction, symbolic and non-symbolic (Delamont, 1983:27). Non-symbolic interaction is roughly equivalent to the biological concept of reflex action in which an individual responds in an apparent reflexive response (Yackel, 2000, Delamont, 1983: 27).

On the other hand, SI refers to the fact that the interaction of interest involves interpretation of actions. According to symbolic interactionist perspective meaning is constituted as individuals interact with one another (Yackel, 2000). The central notion of SI theory is that all humans are possessed of a self and that is reflective or self-interacting (Delamont, 1983: 26).

For the interactionist, society consists of organized and patterned interactions among individuals. Thus, research by interactionists focuses on easily observable face-to-face interactions rather than on macro-level structural relationships involving social institutions.

Furthermore, they focus on interaction and on the meaning of events to the participants. That event shifts the attention of interactionist away from stable norms and values toward more changeable, continually readjusting social processes. Whereas for functionalists socialization creates stability in the social system, for interactionists' negotiation among members of society creates temporary, socially constructed relations, which remain in constant flux, despite relative stability in the basic framework governing those relations.

In sense of classroom research, symbolic interactionist means doing research through interaction and not by testing, measuring and experimenting. It is often called participatory observation because the researcher observes, talks to and participate in activities with the people she/he is studying (Delamont, 1983: 15). Further, interactionists focus on the subjective aspects of social life, rather than on objective, macro-structural aspects of social systems (McClelland, 2000).

According to McClelland, Interactionists tend to study social interaction through participant observation, rather than surveys and interviews. Interactionists' argue that close contact and immersion in the everyday lives of the participants is necessary for understanding the meaning of actions, the definition of the situation itself, and the process by which actors construct the situation through their interaction. McClelland does not deny the subjectivity of the researcher in the research process rather he asserts

> *Given this close contact, interactionists could hardly remain free of value commitments, and, in fact, interactionists make explicit use of their values in choosing what to study but strive to be objective in the conduct of their research (McClelland, 2000).*

Herbert Blumer (1900-1987) was a student and later a professor at the University of Chicago who continued and developed the ideas of Mead. His ideas were important in the development of sociology, countering the dominant approach of social interaction and playing a major part in developing the symbolic interaction perspective as a major school of sociological thought. For Blumer, symbolic interaction refers to the peculiar and distinctive character of interaction as it takes place between human beings. The peculiarity consists in the fact that human beings interpret or "define" each other's actions instead of merely reacting to each other's actions. Their "response" is not made directly to the actions of one another but instead is based on the meaning, which they attach to such actions. Thus, human interaction is mediated by the use of symbols, by interpretation, or by ascertaining the meaning of one another's actions *(Blumer, 1969:4,in Yackel, 2000).*

Blumer came up with three core principles to his theory. They are meaning, language, and thought. These core principles lead to conclusions about the creation of a person's self and socialization into a larger community (Griffin, 1997, cited in Nelson, 1998).

The first core principle of meaning states that humans act toward people and things based upon the meanings that they have given to those people or things. SI holds the principle of meaning as central in human behavior. A second defining principle of SI, in addition to the centrality of interpretation, is that meaning is seen as a social product. Blumer (1969) elaborated this point as follows:

> *It [symbolic interactionism] does not regard meaning as emanating from the intrinsic makeup of the thing that has meaning, nor does it see meaning as arising through a coalescence of psychological elements in the person. Instead, it*

> *sees meaning as arising in the process of interaction between people. The meaning of a thing for a person grows out of the ways in which other persons act toward the person with regard to the thing. Their actions operate to define the thing for the person. Thus,* SI *sees meanings as social products, as creations that are formed in and through the defining activities of people as they interact. (Blumer, 1969:4, in Yackel, 2000).*

The second core principle is language. Language gives humans a means by which they negotiate meaning through symbols. Mead's influence on Blumer becomes apparent here because Mead believed that naming assigned meaning, thus naming was the basis for human society and the extent of knowledge. It is by engaging in speech acts with others, symbolic interaction, that humans come to identify meaning, or naming, and develop discourse.

The third core principle is thought. Thought modifies each individual's interpretation of symbols. Thought, based-on language, is a mental conversation or dialogue that requires role taking, or imagining different points of view.

2.1.1 Rationale for Choosing Symbolic Interactionism as a Framework for this Study

The rationales in choosing SI as framework for this study are: First; it is compatible with social constructivist, which forms the theoretical bases for my investigation of students learning (Cobb and Basuersfeld, 1995, in Yackel, 2000). Second, as Voigt points out, the symbolic interactions approach is particularly useful when studying students learning in inquiry mathematics classrooms because it emphasizes both the individuals' sense making process and the social process. Further neither the individual nor the social is taken as primary (Voigt, 1996 in

Yackel, 2000). Third, the main strength of the symbolic interactions approach has been analysis of face-to-face negation in organizations, which suit the study classroom and their immediate context (Delamont 1983:23). Beside SI, I also employed social interactions in this research.

2.2 Models of Learning and Interaction

This part of the literature reviewed the paradigm shift of different views of learning in general and Mathematics learning in particular. Among the different kinds of models of learning, such as behaviorist, interactionist, and developmental-ineractionist and cognitive, this review of literature gives special attention to the two continuums: Behaviorist (positivist) and developmental–interactionist (constructvism) models of learning.

Gredler (1997:14) summarized the teaching – learning models as follows

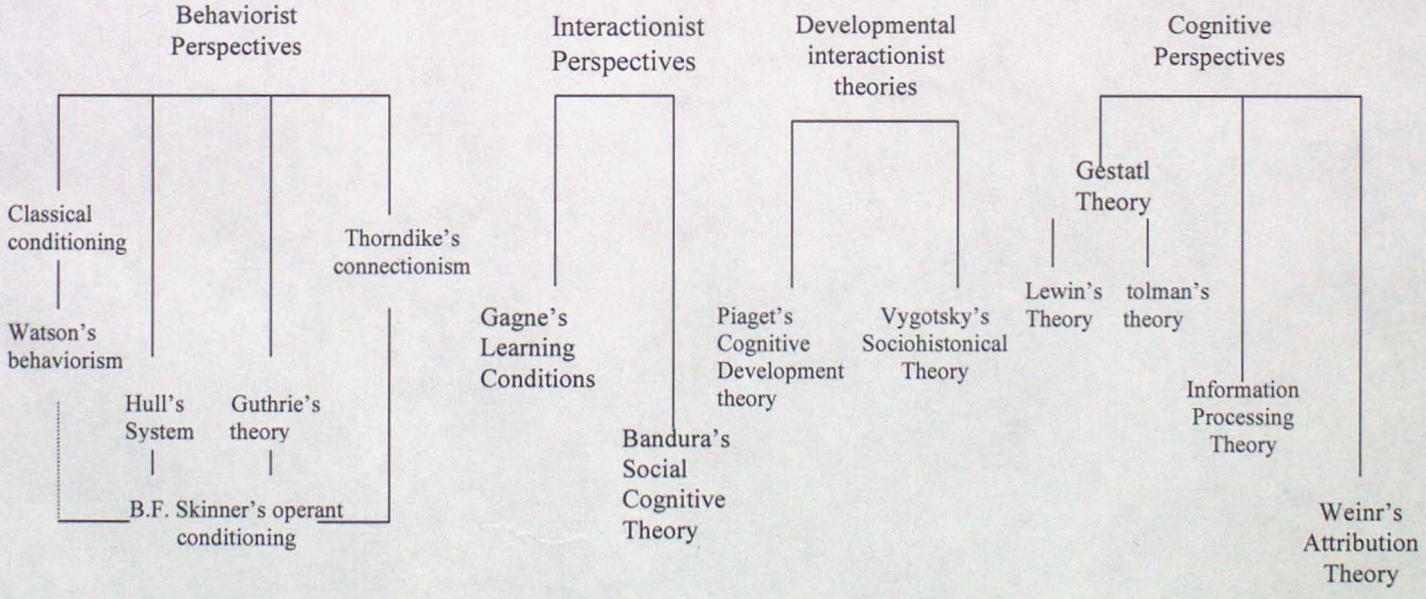


Figure 1

In this Theoretical Framework, besides models of learning, the nature of interaction and its effect on students' mathematics learning is presented.

2.2.1 Behaviorists Model

Today learning has changed from the view of direct transmission model (Nunan, 1996:60), Banking Model (Freire, 1972:45), or imposition (Cobb, 1988 in Jowrisky , 1994 :23) that originated from philosophical stand of objectivism to active construction by the learner (Ernest,1999) , Problem passing (Freire, 1972:45) or negotiation (Cobb, 1988 in Jowrisky, 1994: 23) .

According to objectivism, the meaning of the world exists objectively, independent of human mind and it is external to the knower (Jonassen, 1991; Varasidas, 2000; Ernst, 1999; Amare, 1994). The advocates of this philosophy believe that there exists only one true and correct reality. Hence, as learners, the goal is to gain this knowledge and as educators, to transmit it. Objectivism further assumes that learners gain the same understanding from what is transmitted. Learning, therefore, consists of assimilating that objective reality (Ernest, 1995:8 in Murphy, 1997). In objectivist model of learning; learning is concurred as a process of changing in observable behavior and/or change in cognitive structure or knowledge transfer.

As the objectivist view the teacher is viewed as the source or the origin of knowledge. And, she/he passes the knowledge to her/his students. On the other hand, students are viewed as 'learned' taking into consideration the amount of knowledge they have memorized. Here the main focus of the students as well as the teacher is 'how much' knowledge is transmitted and gained.

Freire (1972) expresses this model of learning as banking system. For him education is an act of depositing in which the students are depository and teacher is the depositor. He further said instead of

communication the teacher "make deposits" issues, which the students receive, memorize and repeat (Freire, 1972: 47). He concludes that knowledge is bestowed by those who consider themselves knowledgeable up on those whom they consider know noting (Freire, 1972:45).

2.2.2 Constructivist Model

The other continuum is constructivism, though constructivism as a philosophy of learning can be traced to the eighteenth century and the work of philosopher Giamnbattisa Vico, who maintained humans can understand only that they have themselves constructed (Thousoulas, 2000). Besides Vico, the work of Dewy, Montessori Piaget (1970), Blumer (1969), Kuhn (1991), Van.Glasafeld (1989) and Vygotisky (1976) are few from the many (W.Gagiron and Callay as cited in Thanasoulas, 2000). According to George constructivist learning model has emerged as prominent approach to learning during the past decades.

Constructivism represents a paradigm shift from education based on behaviorism to education based on cognitive theory (Thanasoulas, 2000). In this paradigm, the accent is on the learners rather than the teacher. It is the learners who interact with her/his environment and thus gain an understanding of its feature and characteristics (Thanasoulas, 2000).

As Ernest contends Constructivism is a theory about learning not a description of teaching (Ernst, 1999). Moreover, the leaner is seen as having the same agentive footing in the interaction as the teacher. The student is seen as active and influences the teacher, while being influenced by the teacher. On the other hand, in the former view of teaching, the teacher was seen as subject and agent, on the contrary a pupil was seen as the object and patient (Erickson, 1996:30).

Furthermore, in this view learning is a constructive process in which the learner is building an internal illustration of knowledge, a personal interpretation of experience. This representation is continually open to modification, its structure, and linkages forming the ground to which other knowledge structures are attached. Learning is an active process in which meaning is accomplished on the basis of experience. Conceptual growth comes from the sharing of various perspectives and the simultaneous changing to our internal representations in response to those perspectives as well as cumulative experience (Thanasoulas, 2000).

2.3 Varieties of Constructivism

There are three major constructivist traditions: educational constructivism, philosophical constructivism, and sociological constructivism: Educational constructivism it self divides into cognitive constructivism and social constructivism (Matthews,2002:5).Widespread interests of this theory have led to a debate between those who place more emphasis on the individual cognitive structuring process and those who emphasize the social effects on learning" (Fosnot, 1996:23 in Epstein, 2002).

According to Epstein (2002) the terms "cognitive constructivism" and "social constructivism" have become common when talking about this psychological theory.

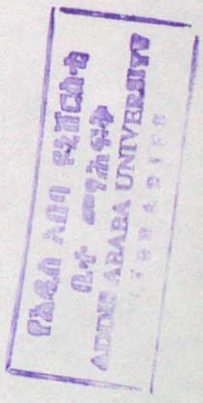
2.3.1 Social Constructivism

Social constructivism emphasizes the importance of context in understanding what occurs in society and constructing knowledge

based on this understanding (Derry 1999 and Memahon 1997 in Kim, 2001).

According to Kim (2001) social constructivism is based on specific assumption about reality, knowledge, and learning. In this sense social constructivism believes that reality is constructed through human activity. Members of society together invent the properties of the world (Kukla, 2000 in Kim, 2001). According to Kim (2001), reality cannot be discovered; it does not exist prior to its social invention. For Kim knowledge is also human product and is socially and culturally constructed (Ernest, 1999, Gredler, 1997, Part and Floden, 1997 in Kim, 2001).

Individuals create meaning through their interactions with each other and their environment, and learning is seen as social process. It does not take place only with in an individual, nor is it a passive development of behaviors that are shaped by external forces (Mcmahon, 1997 in Kim 2001). Meaningful learning occurs when individuals are changed in social activities (Kim, 2001).



The Zone of Proximal Development is the distance between the actual developmental level as determined by independent problem solving and the level of potential as determined through problem solving under adult guidance or in collaboration with more capable peers (Cole, 1962 in Lefrancois, 1994). For Vygotsky, teaching and learning take place in the transition between two levels of development; the actual level of development is what the child can do without assistance. The potential level of development is what the child can achieve with the assistance of a more knowledgeable other who can be either a peer or an adult. The transition between theses two levels is known as the Zone of proximal development (Gredler, 1997:256).

In the teaching and learning, process, a child's performance can be assisted by interaction with a more knowledgeable other who takes responsibility for keeping the interaction within the learner's Zone of proximal development (ZPD), and uses language and a variety of non verbal teaching strategies to facilitate the child's learning (Meadows, 1993).

These strategies need to be responsive to where the child is, but should also promote further leaning and development. In the ZPD, children acquire knowledge, skills, and sense making capacities and tools for thinking and learning, so the teaching learning relationship is reciprocal rather than didactic.

In their interpretation of Vygotsky's theories, Newman and Holzman (1993) characterize learning as a revolutionary process in which new knowledge is not just acquired; it actually changes existing ways of thinking and understanding. However, this does not always occur automatically and the role of the teacher goes beyond that of enabler and facilitator (Newman and Holzman, 1993 in Kim 2000).

2.3.2 Social Interaction

Interaction is one of the most important components of any learning experience (Dewy, 1938, Vygotsky, 1978 in Vrasidas, 2000:1). Interaction can be defined as meaning making process of communication between two individuals or amongst persons. This type of communication could involve verbal or nonverbal symbols signify any thing ranging from an object, a sound a gesture that points to some thing beyond it self.

A current conceptualization of teacher pupil behaviors in classroom views the process as social interaction (Nelson, 1969:1, Amidon 1961:1). Explicit attention to classroom social and socio- mathematical norms and to classroom discourse can result in advancing pupils development of mathematical argumentation and in this process the children learn to explain and justify their thinking to other; they develop intellectual autonomy, and mathematical power (Yackel, 2000). Therefore, it is essential to consider the nature of the interaction that occurs in the mathematics classroom.

The purpose of this study is to discuss about mathematics classroom interaction focusing on social interaction. When two or more people communicate via verbal and /or nonverbal behavior we say that they are in interaction (Bar Tal and Bar Tal, 1986:132).

Interaction takes place in every social system as long as at least two individuals participate in it. Classroom represents a social system with their own norms, rules sets or beliefs and interaction patterns (Feldman, 1990:5) and most of teaching and learning in classroom takes place by means of interaction. Many investigators point out that the actors in classroom interaction are influenced by each other and the teacher and the students an ecology of social cognitive relations in which influences between any and all parties is mutual, simultaneous and continuous (Hicks, 1996:33, Bar-Tal, 1986:5, Delamont, 1983:27).

The interaction in the classroom not only serve to attain educational objective but also functions as mechanism through which a teacher and a pupils realize their personal and social goals, to develop leadership quality, to encourage co-operative strive towards common goals and intellectual autonomy (Yackel, 2000; Bar – Tal and Bar –Tal, 1986:133).

2.4 Common Theories to both Radical and Social Constructivism

While the radical and social perspectives of constructivism each have their particular emphases Ernest (1999) derives a set of theoretical underpinnings common to both:

- Knowledge as a whole is problematized, not just the learner's subjective knowledge, including mathematical knowledge and logic.
- Methodological approaches are required to be much more circumspect and reflexive because there is no 'royal road" to truth or near truth.
- The focus of concern is not just the learner's cognitions, but also the learner's cognitions, beliefs, and conceptions of knowledge.
- The focus of concern with the teacher and in teacher education is not just with the teacher's knowledge of subject matter and diagnostic skills, but with the teacher's belief, conception, and personal theories about subject matter, teaching and learning.
- Although we can tentatively come to know the knowledge of others by interpreting their language and actions through our own conceptual constructs, the other has realities that are independent of ours. Indeed, it is the realities of others along with our own realities that we strive to understand, but we can never take any of these realities as fixed.
- An awareness of the social construction of knowledge suggests a pedagogical emphasis on discussion, collaboration, negotiation, and shared meanings (Ernest, 1999).

2.5 Nature of Classroom of Interaction

As many other interaction patterns, classroom interaction has its own nature. NCI can be described by its characteristics. Classroom interaction can be described by its characteristics. NCI depends up on the participant who involved in the interaction and ways of the interaction. The following are some of the many ways to describe classroom interaction.

2.5.1 Interaction Requires Participants

Classroom interaction involves participants. The participant in the classroom interaction could be two or more than two individuals; a group may interact with another group. As Shelife (1966) Interaction is not limited to interpersonal phenomenon but also may occur in an inter group frame work Shelife, 1966 in Bar –Tal, and Bar-Tal, 1986:133).

In order Interaction takes place at least two people needs to interact each other. In the case of classroom interaction the participants are the teacher and her/his pupils. Interaction may take place with two or more than two individuals, Though, Interaction is not only an interpersonal phenomena, but also may occur in an inter group framework. Two groups or more may interact with each other (Shelife, 1966 in Bar –Tal, and Bar-Tal, 1986:133).

According to Delamont (1976) in classroom all type of interaction takes place (Delamont, 1976 in Bar –Tal and Bar-Tal, 1986:133).

In classroom interaction a teacher may interact with a single student, with group of pupil or with a whole class and a pupil may interact with

an individual a group or the whole class. Also a class may be broken in to sub groups, which may interact with each other (Sharan & Shalan in Bar –Tal and Bar-Tal, 1986:133)

All type of interactions takes place in classroom. A teacher may interact with a single pupil, with a group of pupils or with a whole class. A pupil may interact with other pupil, with a group of pupil or may stand in front of a class and interact with all pupils in the classroom.

In classroom interaction there are many forms of interaction between the teacher and pupils; and between pupils. The following figure represents how classroom interaction takes place and it shows the direction of the interaction pattern.

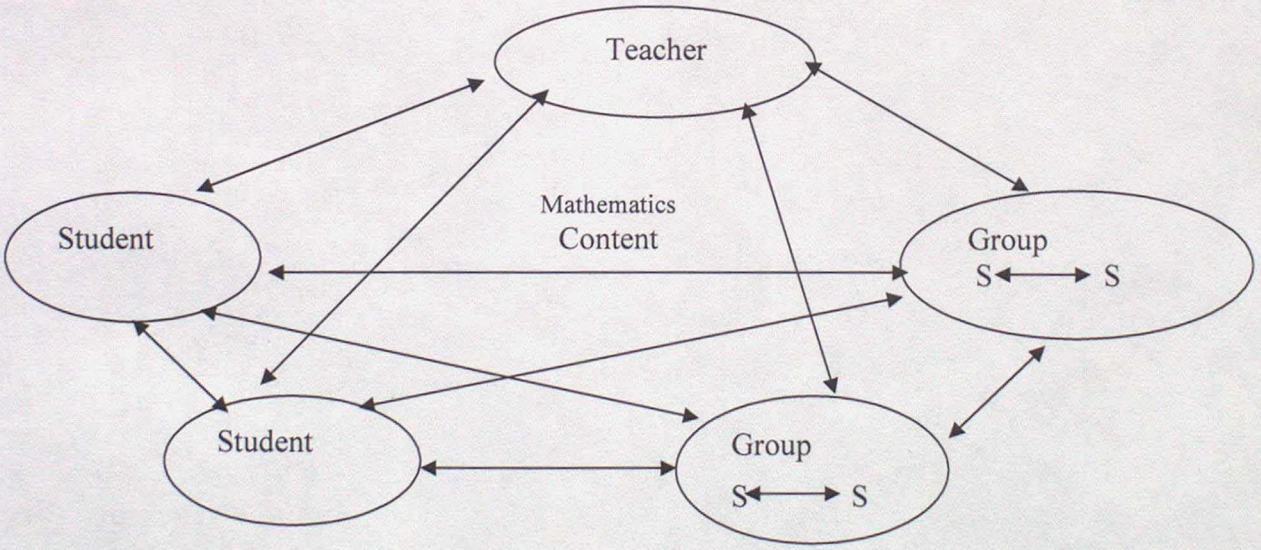


Figure 2: Interaction pattern

Blumer (1969) emphasized the collective nature of such joint action as follows: A joint action, while made up of diverse component acts that

enter into its formation, is different from any one of them and from their mere aggregation. The joint action has a distinctive character in its own right, a character that lies in the articulation or linkage as apart from what may be articulated or linked. Thus, the joint action may be identified as such and may be spoken of and handled without having to break it down into the separate acts that comprise it (Blumer, 1969: 17 in Yackel, 2000).

Blumer further pointed out that it is important to recognize that the joint action of the collective is an inter linkage of the separate acts of the participants. As such, it has to undergo a process of formation and, even though it may be well established as a form of social action, each instance of it has to be formed once again. Consequently, the meanings and interpretations that underlie joint action are continually subject to challenge. This fact makes it possible to explain how it is that both individuals' actions and the joint (collective) action of a group can change over time.

Furthermore, this view of joint action supports the position that a process of social interaction upholds social rules, norms and values. Nevertheless, as we will demonstrate in the case of classroom social norms, the social norms both enable and constrain social interaction.

2.5.2 It is a Dynamic and Changeable Process

Interaction is not static; it is dynamic processes, which change with passage of time (Bal –Tal and Bar Tal, 1986:133). Classroom is a very busy environment in which interaction is understood at the daily give and take between teacher and pupil (Delamont, 1983:28).

This interaction process is based on negotiation between the learners and the teacher. It is an on going process by which every day realities of the school are constantly defined and redefined (Delament 1983:28).

The interaction in the school undergoes change. Though it is divided in to Interaction during lessons and breaks, according to Hargreaves (1975), Classroom interaction takes place in continuous fashion but in various forms (Hargreaves, 1975 in Bal –Tal and Bar Tal, 1986:134).

2.5.3 It Involves Behavior

Individual on groups interact with another by exiting behavior. Because Interaction involves behaviors, And through the behaviors the communication take place (Bar-Tal and Bar Tal, 1986:135).

Behaviors in the classroom interaction can be verbal and/or non-verbal. That is an interaction in the classroom involves exchange, non-verbal exchanges or both. The verbal exchanges consist of sequence of speeches that express language, of intonation, which includes pitches, stress and caught, splutters, giggles, crying, laughing or yawning. On the other hand, the interaction may include nonverbal exchanger included kinetics which consists of body and facial movements that accompany verbal and motor movements which included voluntary and involuntary acts (Bar-Tal and Bar Tal, 1986:135).

According to Bellack and Davit, (1972), the dominant classroom interaction pattern is verbal exchange (Bellack and Davit in Bar-Tal and Bar Tal, 1986:135) a teacher interact with his/her students via speaking to each others. The teacher may change his/her interaction during classroom interaction she/he may laugh.

2.5.4 It has a Rule

Interaction has rules. They usually do not occur in choose, but are governed by norms. The norms may be unique to a specific interpersonal interaction, to a specific group, to specific institution. Classroom Interaction is also organized in accordance to rules (Sakeson, 1968, in Bar-Tal and Bar-Tal, 1986:136). These rules develop in the specific school and the specific classroom, though they must be compatible to the norm of the society. They may also vary from situation to situation. The norms determine such rules as who opens an interaction, when and how others participate, what kind of behaviors it involves, how many participants may participate, the length of interaction, etc.

Classroom interaction is also organized in accordance to rules (Jackson, 1968 in Bar-Tal and Bar-Tal, 1986:136). All members of the classroom share part of the rules of classroom interaction and the rules are depends on variables such as teacher's status, children's rights, or importance of education. In centralized school systems, some rules for classroom, though they most always must be compatible to the norms of the society from which the pupils come.

At a school level, the principal, the board, or the teacher's council determines rules of pupils' and teachers' behavior, which affect classroom interaction. In the classroom environment, the teacher sets many of the rules and many others develop between the specific teacher and pupils during their interaction. Both learn what is desired, what is allowed, or what is forbidden. A teacher and pupils learn to follow the rules of classroom interaction which indicate, for example, when to speak, what can be said, how long to speak, or what kind of nonverbal behavior can accompany speaking. Thus, each class develops its own set

of rules which together, with other given rules, govern classroom interaction (Bar-Tal and Bar-Tal, 1986:136).

2.5.5 It is affected by Various Factors.

There are different factors affecting classroom interaction such as the classroom size, available furniture, the intensity of the light a parade of observers may affect the nature of interaction. In general classroom interaction can be affected by physical and social environment (Bar-Tal and Bar-Tal, 1986:137).

Interactions do not take place in a vacuum but in physical and social environments. The environment in which an interaction takes place influences it. Factors such as size of the room, available furniture, the intensity of the light or presence of observers may affect the nature of the interaction (Altman, 1975 in Bar-Tal and Bar-Tal, 1986:136). Any analysis of an interaction must take the environment in which it takes place into consideration.

Classroom interaction takes place in a school. The room in which it occurs contains a blackboard and desks. Between twenty to forty pupils either witness an interaction or participate in it. All these features affect the process and the out come of classroom interaction. But, classroom differ from one another in such characteristics as size of the room, the arrangement of desks, the seating position of pupils, the number of pupils, or the wall's decoration. These characteristics and other can be considered as factors, which affect classroom interaction (Weinste 1979 in Bar-Tal and Bar-Tal, 1986:136).

2.6 Setting of Classroom Interaction

Setting of classroom interaction the physical, temporal, organizational and educational context in which classroom are embedded are very important in analyzing classroom interaction. According to Delamont(1983), classroom settings are classified into four major categories: temporal setting, physical setting institutional setting, and educational setting (Delamont, 1983:30). I employed the same classification in describing the classroom setting g in this study.

2.6.1 Temporal Setting

As mentioned before classroom interaction is not static, classroom can only be understood when it is accepted that they are situated in time (Delamont, 1983; 30). Temporal setting of classroom is the dynamic nature of classroom in which the norms are defined and redefined through the passage of time.

2.6.2 Physical Setting

According to Delamont, there are three aspect of physical setting of classroom encounters which may useful be distinguished: The location of the school, the spatial relationships between the classroom and test rest of the school, and the layout and decor of classroom it self (Delamont 1983:33). The location of the school includes that whether the school is residential suburb, isolated mining village, be it at market area, and whether there is music shop nearer to the school or not and so on. The spatial relation ship between the classroom and the surrounding school can have far- reaching implications for teaching and learning process (Delamont, 1983; 34).

2.6.3 The Institutional Setting

The term institutional is defined as the classrooms background the whole school. All schools have a set of rules and policies concerning the pupils' conduct, the sphere of discipline or institutional control. How ever, the extent and nature of the institutional control system varies from school to school, as does the extent to which the school region penitents into the classroom (Cambert etal 1970; In Delamont, 1983:41).

2.6.4 The Educational Setting

The classroom has to be seen against a background of an educational system operating at school, local and national levels. At school level, with which we are here concerned, educational policies are subject to constant bargaining like the organizational system. Educational policies relate to such issue as choice of curricula, forms of assessment provision of appropriate texts and other resources and proper qualification for staff recruits (Delamont, 1983:45).

The above setting of schools are important in analyzing classroom interaction one should give emphasis for the setting so that she/ he can understand the entire nature of classroom interaction.

CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter focuses on the methodology used to carry out this qualitative research in mathematics classroom interaction. More explicitly, the concern of the chapter revolves around the method used in the study, the rationale for using qualitative method, the participant and data gathering and analyzing techniques.

This study was proposed to understand the nature of mathematics classroom interaction and the study sought to examine the factors that influence student's interaction towards their teacher and peers in the mathematics classroom. It also aimed at finding out how the factors influence the teacher –student as well as student-student interaction.

Methodology is a widely used term in research, which refers to the way that we approach real life problems and seek solution or describe some phenomena. In this regard, one's theoretical perspective on the nature of knowledge, learning and education assists one to set his/her research problem and determine the research methodology. Our assumption, interest and purpose shape which methodology we use. Solomon sheds light on this idea saying that a research problem could be studied either qualitatively or quantitatively depending on the research orientation the researcher has (Solomon, 2004: 1).

3.2 Rationales for the Use of Qualitative Research Methodology

In previous studies, classroom interaction pattern was mainly studied using frequency, intensity and amount. However, the nature and pattern of classroom interaction cannot be fully understood by applying only these techniques. It rather needs to be explored in such a way that participants' of classroom interaction could be examined qualitatively. As result, qualitative research was implemented so that detailed information would be gathered and analyzed. Denzin and Lencoln (2000) have the following to say in support of qualitative research as more appropriate to understand events which cannot be experimentally examined.

> *Qualitative research emphasizes on process, on qualities of entities and on process and meaning that are not experimentally examined or measured in terms of quantities, amount, intensity or frequency (Denzin and Lencoln, 2000:8).*

Basically, the aim of this research was not to count the occurrence of interaction in mathematics classroom. Rather the purpose of this study was to describe the nature of mathematics classroom interaction in the case of City Secondary School. This study, more specifically, sought to understand how students interact in the classroom with their teachers and among themselves and why they prefer to act that way. Moreover, this study intended to explore what factors influences their interaction. I am not interested in numbers rather in words and pictures from which I learn about the phenomena. Plainly my interests in this study are the following:

- *I was concerned primarily with process rather than the outcomes or product.*

- *I was interested in identifying how students and teacher make sense of their interaction in mathematics classroom discussion.*
- *I wanted to gauge how the participants act in natural setting.*
- *I was interested in understanding process and meaning gained through words or pictures.*

These assumptions were adopted from Merriam (1988:17-20) and I contextualized them to the purpose of the present study.

Qualitative research is a generic term for investigative methodologies described as ethnography, naturalistic, fieldwork or participant observation research. The word qualitative by itself implies that emphasis is given to qualities of entities and to process. Moreover, it emphasizes, the importance of looking at variable in natural setting in which they are found and see things in a holistic manner.

Unlike quantitative methodology, qualitative research methodology is more appropriate to understand a situation in its context. And it aims to provide an in depth understanding of problems, perspective and setting (Spencer, et al. 2003: 17). And qualitative research is more suitable than quantitative to understand the process.

Consequently, qualitative research methodology, based on social constructivism and symbolic interactionism, was used for this study.

3.3 Design of the Study

After deciding to use qualitative research methodology, I considered which method among the few tradition such as Biography, Ethnography, case study, Grounded theory and Phenomenology would be the most appropriate in order to pursue the aim of this study. As the aim of this study was to have a holistic understanding about the nature of interaction in mathematics class, I designed my research in the form of qualitative case study to explore the nature of classroom interaction.

In order to choose an appropriate method of inquiry for my research work, I consider the nature of my research question, the amount of control and the desired end product. These are issues to be considered when deciding whether case study is appropriate design for investigating the problem of interest (Merriam, 1988:9).

A case study is a holistic inquiry that investigates a contemporary phenomenon of the classroom interaction within its natural setting. Moreover, qualitative case study is an intensive, holistic description and analysis of a single instance or social unit. It is a method for learning about a complex instance, based on a comprehensive understanding of that instance obtained through extensive description and analysis of that instance taken as a whole and in its context (Merriam, 1988: xiv).

In studying classroom interaction, it is very important to have a detailed investigation of individual, groups in situation or other social units. Case study attempts to analyze the variable relevant to the subject under study.

observed regarding mathematics classroom interaction at city secondary school hence this study is a descriptive one.

On the other hand, Stake classified case study in to three as Intrinsic, Instrumental, and Collective. A case is collective when a group of cases is studied as a unit; it is Intrinsic when the researcher has an interest in the case: the last one is referred to as instrumental when the case is used to understand more than what is obvious to the observer (Stake, 1995:3-6). Primarily in this study I am interested in the issue and the case is secondary. I used the case as an instrument to understand the nature of classroom interaction at city secondary school. Therefore, my case is instrumental case study. A Case study could be single-case or multiple-case applications. I study a single case. Hence my case is single, descriptive, and instrumental.

3.4 The Context of my Study

3.4.1 Selection of the Research Site

This descriptive study focused on a group of secondary school students' nature of interaction in their mathematics classroom. The criteria set in the selection of this school and grade level is based on Marshall and Rossman (1995). According to them the criteria in choosing research site are: 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 (Marshall and Rossman,1995 in Robinson).

The criterion in choosing the school was my experience during in my stay in city secondary school. I had been teaching in this school for one year. During that time I had a good relation with the staff and students, too.

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The criterion in choosing the school was my experience during in my stay in city secondary school. I had been teaching in this school for one year. During that time I had a good relation with the staff and students, too.

All these helped me to get access to the research setting and thereby developing confidently among the research participants. This in turn contributes in building trust and relations with the participants. In general, in City Secondary School regarding my research, there is a high probability that rich mix of interaction pattern that help to the quality of data and credibility of the study are reasonably assured. Based on the above I choose city secondary school to be my research site.

In addition to this, City Secondary School was chosen because the school is required to meet a level of secondary school consisting of only girls and whose willingness to participate in the research was considered.

3.4.2 Setting of the Research Site

The settings of the classroom, such as; physical, temporal, organizational and educational context in which classrooms are embedded, are very important in classroom interaction analysis. It would be difficult to analyze data without considering the context, and the context in turn determines the setting. According to Delamont (1983), setting is used as a broad term covering all aspect of temporal and institutional context in which any particular classroom is to be found. Classroom setting comprises temporal aspects of classroom interaction, the formal organization of the school, the social and educational context and physical surrounding in which they take place (Delamont, 1983:30).

- **Physical and Temporal Setting**

The research site for this study was City Secondary School, which was founded in 1927 to provide education for girls. The Ethiopian Catholic

Church is the owner of the school. The school programs are direct and implemented by the Daughters of Charity of Saint Vincent De Paul under the auspices of the Ethiopian Catholic Church. There are approximately 1694 students from pre-kindergarten through the twelve grades in addition to TVET and the Mentally Retarded Program.

The school is found in Gulelel Kifle Ketema near Semen Mazegaja. The school premises cover 6,490 square meters including the sport field, which was annexed by the school latter on.

The school was originally a boarding school for girls from the City and countryside who would not receive education otherwise. The school caters for children of different ages and ability groups from varied socio-economic background, including those who are Handicapped and with learning difficulties.

Now the school admitted students whose interests lie in academic and vocational streams. Each applicant and parents are interviewed before admission. The school's policy was to admit students with good character, conduct, and academic achievement. Approximately 5% of the students were awarded scholarships.

The school has a variety of official policies. One policy requires that the students wear uniforms. To satisfy the work requirement, students acted as monitors, assisted coaches, or became peer leaders. Beside this, students are involved in various clubs in the school.

The academic year is divided into two semesters. There are no classes for credit during the summer. They must repeat the class if they fail. The school offered subjects including Mathematics, English Language, Amharic Language, Biology, Chemistry, Physics, Geography, History,

Civics, Computer Science, Economics, and French, Music Theory. Almost all their graduates attend college. Last year out of 94 students, all except one scored 'very good' and 'excellent' in national examination (EHECE).

- **The Educational Setting**

A classroom is not an isolated social environment; rather it has to be seen against a background of an educational system operating at school, local and national level (Delamont, 1983:31).

As Delamont(1983) Educational setting mostly observed from four basic issues such as choice of curricula, form of assessment , proper recruitment for qualified staff and provision of appropriate text and other resources(Delamont, 1983:31).

- **Choice of Curricula**

Like any government, private and mission schools in Ethiopia, City Secondary School is governed by the educational policy of Ethiopia. Therefore, it follows the curricula set by the government with slight modification.

City Secondary School has TVET, Preparatory program, and a special class for mentally retarded students. The TVET program is designed to provide training on two programs specifically secretarial science and accounting for students who cannot join the pre-college program.

There is preparatory program, which is designed for students who pass EGSECE (a national examination given at the end of Grade 10). Students have an opportunity to choose to join a natural or social science stream. The selection has its own procedure and criteria. There are two classrooms for each stream in both grade eleven and twelve. The same

mathematics textbook is organized for both streams. From grade eleven portions not all the chapters are taken by both streams, rather some are designed for the social science students and some others for natural science; like vector is for natural science and business maths is for social science students. In grade twelve mathematics textbooks, there are six chapters, which are designed for both streams. When the research was conducted grade twelve students were discussing the last chapter of the text.

- **Form of Assessment**

Classroom tests, mocks, model and final exam are the major tools of assessments. Though there is no fixed schedule for classroom tests, I have observed that teachers arranged their time to give tests. To minimize cheating by the students and to easily manage classroom tests, teachers use the assembly hall for conducting tests. Teachers in City Secondary School give marks for homework's to motivate the students and obliged them to do the homework. Besides this out of the total hundred marks ten percent is assigned for classroom participation and for the completeness and neatness of their exercise books. The teacher is the only responsible body in setting the standards for the evaluation regarding classroom participation and exercise book of the students.

Final exams are given twice a year, one at the end of each semester. Mid exams are also given in every half of a semester. Like wise, model exams are arranged for Grades 8, 10 and 12. The purpose of these exams is to prepare the students for their national examinations; even the exam type is similar with the national exam so that the students are familiar with such types of questions. In other examination the teachers are expected to include different type of questions (objective and subjective), but in

model exams all the questions are multiple choice and students are given answer sheet to blacken a circle.

- **Provision of appropriate text and other resource**

There is one bookstore in City Secondary School where students can buy textbooks. From the observation and interview, I found out that students are advised to come with their own textbooks especially in mathematics class. However many students are not willing to come with their own text.

- **Other resources**

There is one library in the school. Students have pockets to borrow books from the library. The library has 11,250 different books. Its capacity is 300 readers at a time, and three professional and two supporting workers and one secretary run it.

In addition to the library, there are three laboratories for Physics, Chemistry, and Biology departments with science kits. There are also two computer labs with 26 computers each.

- **Proper qualifications for staff recruits**

According to the school documents, there are 69 teachers in the school. Of these one has a master's degree, 45 have first degree, 16 have a diploma and 7 have certificate. All teachers in the school are assigned according to their qualifications.

Teachers are recruited based on their qualifications and work experience. The school highly relies on Interview and peer teaching to recruit teachers. The other source of information to recruit teachers is recommendation from the staff members. Accordingly the two teachers in grade twelve are recruited based on their reach experience in teaching

and the qualification. Both teachers have first degree in mathematics. And one of them is a unit leader in the school. The other teacher has taught mathematics in different private and mission school.

3.5 Data Gathering Technique

The data gathering techniques that I used in this study are personal observation, interviews, focus group discussions, and field notes. Observation was the main data gathering technique accompanied with in-depth interview to reach the aim of this study.

3.5.1 Observation

The observation was carried out continually for three weeks and spontaneously. The majority of the observation was recorded with two cameras from two directions (one at the front of the room focused on students and the other at the back of the room focused on at the board) Each of the lesson, that was observed in the classroom, was under the supervision of the classroom teacher. I did not use structured observation format so that I could see the entire interaction; I recorded everything that occurred in the classroom.

3.5.2 Interview

Semi-structured interview was used in this study. In qualitative research, in-depth interviewing is an important research tool for data gathering, with the researcher as the measuring instrument. Besides classroom observation, interview was used as major tool for gathering data. The interview guide (Appendix A) was constructed after observing the recorded classroom observation to include the participant views and to have a clear understanding on the classroom interaction. Qualitative

interviewing has been valued as non-directive, unstructured, non-standardized and open-ended. In-depth interviewing is a process in which key informants are asked to comment about certain events. In depth qualitative interview is quite different from formal question-answers exchange. They may propose solutions or provide insight into events.

The entire interviews were audio taped and transcribed. In the interview six grade twelve students and a teacher participated. The Teacher was selected because he was teaching mathematics in grade twelve. This teacher helped me in selecting students. While interviewing the six selected students, I add two more students with the recommendation of the students I interviewed.

3.5.3 Focus Group Discussion

To support the interview, focus group discussion was implemented. This was also an important source of information for my case study. In the focus group discussion nine students were participated from the different sub groups in the class. I have also corroborated evidence obtained from other sources, like field notes, informal discussion, and my own experience as a teacher in this school.

3.6 Sampling

My interest in this study was focused on what can be inferred from what is going on inside the students' head rather than a blatant response. I employed a Network selection criterion-based sampling technique. In network selection each participant or group is named by the preceding

group or individual (Merriam, 1988:50). The participants were selected based on teachers and school unit leaders' recommendation and students' referrals. Therefore, I can say I purposefully selected the participants in the research. In purposive sampling (also known as judgmental sampling) the researchers purposely choose subject who in their opinion are through to be relevant to the research topic (Bauman and Atkinson, 1995).

Analysis

Unlike quantitative research method, in qualitative research data gathering and analysis are usually simultaneous activities (Maxwell, 2005:95). In this study, I also tried to analyze my data from the time that I took the first observation. At the beginning of analysis things were vague for me. But after some steps I could see the solid picture of the data.

To address my research questions, the analysis focused on describing a holistic picture of the classroom interaction. Observations were made six times. All of them were recorded and analyzed. Alongside interviews were examined looking for both common and distinctive ideas. Rentat Tsech reviews various approaches that have been used to analyze case study data. She classified them in to three types: Interpretational analysis, structural and reflective analysis (Rentat Tsech in Borg and Gall, 1996: 562). Of these different types, I preferred to use Interpretational analysis technique for this study. Which is the process of examining case study data closely in order to find constructs, theme and patterns that can be used to describe and explain the phenomenon being study.

According to Maxwell (2005), there are many analytical options that fall into three main groups. These are memos, categorizing, and connecting categories. This process is based on reduction and interpretation of the data. Coding was used to accomplish these goals. As Maxwell (2005) pointed out, coding is the main categorizing strategy in qualitative research. This is quite different from coding in quantitative research. As he mentioned in qualitative research the goal of coding is not to count things, but to fracture the data and rearrange them into categories that facilitate comparison between the same categories (Maxwell, 2005:102).

For analysis of observation in classroom classification was used as Student and teachers interviews. The classified data were coded line by line. These helped me in categorizing and rearranging the data. The rearranged data were categorized in two categories: The Social Norms of Classroom Environment and Nature of Classroom Interaction and Its Implications. From these two categories themes were drawn and analyzed.

3.7.1 Ethical Consideration

In social science research especially in qualitative research code of ethics are conventional format. According to Christians (2000) informed consent, deception, privacy and confidentiality, and accuracy are the major guidelines in setting the code of ethics (Christians 2000:138).

In this research regarding informed consent I believe that the participants have the right to get informed about the nature of the research. As a result the participants were informed about the nature and the consequence of the research. The participants were informed about my ethical consideration in written form. I have asked permission from the principal of the school as well as from the respondents. And I

obtained the necessary permission to conduct the study. Students were asked to participate in the research voluntarily without physical or psychological coercion; I also informed the respondents that they were free to terminate the interview any time they wished.

In this research I have tried to be honest in the process. The third component was privacy and confidentiality; confidentiality must be assured as the primacy safeguard. Regarding this, the participants were assured that their name would not be disclosed or linked to any description of analysis without their permission. All information received from them was treated with the utmost confidentiality. The code of ethics of this research is attached in appendix B part.

3.7.2 Effort

To maintain the quality of the study, I have made a repetitive observation of my participants. I have also kept a good record of data, by having peer review. My classmates were involved in the peer review of my study. Besides, I exerted maximum effort in understanding and interpreting the research context.

3.7.3 Trustworthiness

According to Lincoln and Guba (1985) the positivist criterion of internal validity, external validity, reliability, and objectivity are replaced by terms such as credibility, transferability, dependability, and conformability (Lincoln and Guba, 1985 in Spencer et al. 2003:40). Trustworthiness of this study was ensured the following issues rose below.

- **Credibility**

Credibility is ensured by prolonged engagement, persistent observation, triangulation, peer debriefing, and member checking (Guba & Lincoln, 1994). To ensure credibility I triangulate observation, field notes, and interviews that revealed similar ideas. Moreover, I fulfilled prolonged engagement and persistent observation by visiting the classroom and I have observed the video record several times.

- **Triangulation**

As a researcher, I must avoid becoming dependent on a single informant, and seek the same data from other sources to verify its authenticity. Rather, the Trustworthiness of data must be justified by triangulation. According to Tellis (1997), case study is known as a triangulated research strategy. And Dezin (2000) stated that triangulation can occur with data, investigators, theories, and methodologies; and based on this four types of triangulation are identified.

Of these four triangulation techniques, in this research I used Data triangulation and Methodologies triangulation. Data triangulation involves the convergence of multiple data sources. This technique allowed me to look for the data to remain the same in different contexts.

In this regard, data from students' crosschecked teachers' interview, observation. Another type of triangulation procedure was Methodological triangulation. Methodological triangulation was used one approach is followed by another, to increase confidence in the interpretation or which

involves the convergences of data from multiple data collection source. In this regard, the interview data was crosschecked through classroom observation and FGD data.

- **Transferability**

In quantitative research external validity is justified by the ability to generalize findings across different settings. Unlike to this qualitative researchers deny generalizations of data. For instance, Cronbach discusses the problem by saying:

> *The trouble, as I see it, is that we cannot store up generalizations and constructs for ultimate assembly into a network. It is as if we needed a gross of dry cells to power an engine and could only make one a month. The energy would leak out of the first cells before we had half the battery completed (*Cronbach, *in Hoepfl, 1997).*

According to (Hoepfl, 1997) in the naturalistic paradigm, the transferability of a working hypothesis to other situations depends on the degree of similarity between the original situation and the situation to which it is transferred. The researcher cannot specify the transferability of findings; he or she can only provide sufficient information that can then be used by the reader to determine whether the findings are applicable to the new situation (Lincoln and Guba, 1985 in Hoepfl, 1997). Therefore, to maintain transferability, I provided a thick description that another could understand what was happening to City Secondary School to determine if the results are transferable to anther similar situations.

- **Dependability and Conformability**

According to Hoepfl(1997) in quantitative research which relies on quantitative measures to define a situation is relatively value-free, and therefore objective. On the other hand, qualitative research, which relies on interpretations and is admittedly value-bound, is considered to be subjective. In quantitative research, subjectivity leads to results that are both unreliable and invalid. There are many researchers, however, who call into question the true objectivity of statistical measures and, indeed, the possibility of ever attaining pure objectivity at all (Lincoln and Guba, 1985; Eisner, 1991 in Hoepfl, 1997). As Hoepfl summarizes Patton's view on objectivity and subjectivity

> *Patton (1990) believes that the terms objectivity and subjectivity have become "ideological ammunition in the paradigms debate." He prefers to "avoid using either word and to stay out of futile debates about subjectivity versus objectivity." Instead, he strives for "empathic neutrality" (p. 55). While admitting that these two words appear to be contradictory, Patton points out that empathy "is a stance toward the people one encounters, while neutrality is a stance toward the findings" (p. 58).*

In this study, data were collected until saturation occurred with redundancy of categories and themes across the interviews. This study employed triangulation to enhance trustworthiness. Peer review provided feedback regarding methodology, coding procedures, and reliability procedures and verified that the subcategories, core categories, and themes accurately reflected the meanings of the participants' experiences. Also I have tried to be non-judgmental, and strived to report what is found from different data sources and data gathering techniques in a balanced way.

CHAPTER FOUR

DATA ANALYSIS

4.1 Introduction

This section of the study deals with the analysis of the data. I analyzed the data by forming two major themes: the Social Norms of Classroom Environment and NCI and Implications for classroom interaction. Likewise, each of the major themes is categorized in to sub-themes.

In order to keep the research participants anonymous in this study, I have used pseudonyms in the entire study. Alongside, in this chapter all written in italic are the participants own words and the rest are my interpretations and understanding.

4.2 The Social Norms of Classroom Environment

4.2.1 Tenets of the Majority

In analyzing my data, which were gathered through personal observation and interview, the first thing that I did was to understand what goes on in the classroom. From the Symbolic Interactionist point of view things do not have inherent meaning in and of themselves, but the meaning is socially created, through experience as one interacts with other individuals and groups in classroom. I have also learned that the classroom which I observed has its own social norms. This social norm makes the classroom distinct. These constituted social norms in the class have a considerable consequence on my understanding of the nature of interaction.

class have a considerable consequence on my understanding of the nature of interaction.

As I have observed, students through interaction in the socialization of school compound, they constitute norm that govern them how they interact with their teacher and students too. Students in the classroom are expected by their teachers as well as by their peers to act according to the constituted norms or rules. The norms are some thing, which is deferent from rules. The school mostly states rules but not norms. Rules include the school policies like what to wear during school time, rules for absentees, and rules for how to evaluate and so on.

Classroom norm is well defined by Yackel (2000) as sociological construct and refers to understanding that became normative or taken– as –shared by the group (Yackel, 2000). It is a collective notion that helps to describe the expectation and obligations, which are constituted in the classroom.

In case of my study, students have constituted their own norms in their particular classrooms. The constituted norms in which students participate are joint action. From the point of view of symbolic interactionism, which assumes that there can be joint action, or social acts in which a number of individuals act together, sharing their construction of what is going on (Delamont, 1983:27) Here even though Delamont (1983) asserted that students share on constructing the classroom norms, in most cases the norms are constituted based on the majority interest.

These norms are not something that occurs spontaneously; rather they are constituted in the course of the dynamic process, which is modified with passage of time. The norms are not only constituted individually but

also socially. Here while the norms got acceptance, the participants, attach meaning to them in order to be governed by the norm. For Bishop, meanings are at once "individual and personal" and "socially constructed" (Bishop, 1988: 153-154 in Chapman, 1997).

As Chapman (1997) summarized Bishop's view, he included that people share and contrasts their own personally achieved meanings in order to come to agreement over the sense of their different meanings; it is in this agreement that meanings are 'socially' constructed. Social semiotics, a synthesis of contemporary approaches to the social production of meaning, provides the contrasting perspective that meanings are continually constructed within, rather than prior to, the processes of social interaction. People talk together to argue, query, make claims, suggest, and negotiate; these are the means whereby meanings are constructed. Meanings are contingent on human interaction, on context.

These differences notwithstanding, Bishop's work importantly provides a strong case for understanding school mathematics as a social process. His case is that (mathematics) education is essentially interpersonal. Whether meanings are made personally or socially, it is clear that social interaction is a critical element of classroom learning (Chapman, 1997).

Through this, social interaction norms are constituted and every of the members in the class are anticipated to follow the constituted rules and norms. This is because, in most cases the classroom norms are constituted based on the majority's interest. As a result meaning is constituted. Meaning is a social product of the class and students act according to the norm. As I have understood from the FGD every member of the class wants to live like others do.

> *...ooh There are no...such kind of students. Every one wants to live like others...No student wants to be marked distinctively. All wants to live like*

others. ተለይቶ መውጣት የሚፈልግ ተማሪ የለም ተመሳስሎ መኖር እንጂ It is accustomed living like the majority of the students.

(FGD, March 14, 2006).

Moreover, Saron also argued that they are governed by their rules not to be away from 'home'. She also asserted that they all look alike. In her descriptions, she told me the entire class member should follow the norm:

Generally speaking all students want to look alike.

(Saron, March, 6, 2006).

So, what I understood from this situation is that their norm directs their interaction. Even if they don't believe in it they surrender themselves for the constituted norm. In connection with this, in one of my classroom observations, just at the end of the class, the teacher told the students that he had intended to give them a test after two days. Subsequently, two or three students complained, but the teacher assured that he would not change the date. Without more ado almost all of the students reacted against him shouting together. However, I saw that one of the students was disappointed with what was happening. I could clearly read her disappointment from her face and asked her after the class. She verified that she would be an outcast from the existing norm. For better understanding I have presented part of the discussion as follows.

Q. Are you happy?
A. ye...s (hesitate)...why did you ask?
Q. you didn't shout when the others did
A. you know... I wanted to take the exam on Friday (the date appointed by the teacher) because on Monday (students choice) we also have another test

Q. so, why didn't you protest against the *students?*
A. they will not be happy (ይደብራቸዎላ).

(Field note, March 2, 2006).

Here what I comprehended from the above conversation is that she preferred to be governed by the interest of other students. She couldn't interact with the teacher to declare her interest and wishes because she knew that the majority would win over her. She thus, preferred to be governed by the interest of others. In other words, even though, she didn't want to take the exam on Monday, she accepted it because of the norm of the class. Accordingly, the norm, which the majority has framed, is supposed to be followed by the entire member of the students.

In the interview Saron tries to describe one of her classmate Hermela. According to her descriptions Hermela is the best scorer in the class. In her description Saron gives emphasis on the importance of act upon the undeclared rules.

> *..Look, Hermela is not... 'Geek'* (I will discus this latter). *Even if she stood first in the previous semester, she never obeys our rules...she does what ever we decide to do together.*
>
> (Saron,March ,6, 2006)

In attempt to understand the interaction in mathematics classroom, students have been observed acting in different way in different subjects. In the interview with one student I have found that they act differently in mathematics class. Saron, who is a social science stream student, has a say on this.

> *... There is high interaction in history class but not in Mathematics class. I mean there is less interaction in later.... Even though there are students who interact, it is*

impossible to say there is interaction in those subjects.

(Saron, March 6, 2006)

In previous studies of classroom interaction as Smith (1986) contended, the classroom has been treated as homogeneous entity in which the same norms of behavior are presumed to hold through out the entire lesson (Smith, 1986:72). However, several researchers have demonstrated that different social structure and behavior norms prevailed at different times during each class period (Bremme and Erikson, 1977, Gottlib, 1978, Gump, 1967 cited Smith, 1986:72).

4.2.2 Classroom as Sharing Different Lifeboat

As I have tried to mention in the above statements, students have classroom norms, which are constituted, based on the interest of the majority. Since the majorities do not represent the whole class, there are some students who do not abide by the norms, which results in the subdivisions of the classroom into different subgroups. According to Bar-Tal and Bar-Tal a class as a social system may be broken into sub groups. This may be done formally by the teacher or informally through the dynamic of the social relationship (Bar-Tal and Bar-Tal, 1986:134). Here, students are the partaker in the formation of subgroups.

Accordingly, my concern is to deal with the process how students form the subgroups through the dynamic process, which is the informal one. Moreover, students in the class perform according to their norms. These performances organize the class into different sub groups. However, this formation of sub-groups is not an overt action; rather, it is constituted through time. As a result, students arrange their sitting areas according to the subgroup they belong to. Thus, sitting arrangement is one of the many consequences of the norm. In most cases, their sitting

arrangement determines where their position is in the classroom. The following excerpt also provides an additional layer for the above discussion.

> *...we have our own 'territory'...Even we differ by our sitting arrangements*
>
> (Edom, March, 10, 2006).

In addition, the students' interaction is determined by their sitting arrangements. They have classified themselves into three groups: students who took the front seats are called "Geeks" or 'Nerds' and those who seat at the back are leveled as low scorers by the rest, and the majorities of the class, the so called the driving agent of the classroom norm.

From the observations as well as from the in-depth interviews I had with students, the so-called 'Geeks' interact with their teachers than any of the other students. This is mainly because; the students who belong to the 'Geek' group do not follow the majorities' norm. The students, who belong to the majority group, describe the so-called 'Geeks' as:

> *'Geeks' are those who want to look... different from the rest of us, like to show off 'Geeks' – አካባቢች – they wants to look as though they know everything while they actually don't ... They never give up...they ask question even at the last minute of the class time... they just never give up even when we want a break ...Of course they are high scorers*
>
> (Mary, March, 7, 2006).

In most cases, these students are high achievers. However, there are also students who govern themselves with the majorities' norm and are high achievers such students are not labeled as 'Geek' by others. The following excerpt can stand in support of the above statements. Mary,

one of the student participants described the 'Geeks' as they are active in classroom but not in the social environment. To assert this she took Genet as an example. Genet is one of the brilliant students. Her status in the classroom has two aspects: statues with teachers and peers.

In most cases those who are popular by the staff may be dislike by all the other pupils. Genet's case is different. Her teachers like her for that she is attentively following the teacher while others are talking with each other. On the other hand, she is liked by the peers for that she is not 'Geek'. Marry has the following regarding Genet.

> *No...! She is not a 'Geek'! ... Of course she is brilliant... Even in math, but she keeps things simple, አታካብድም:: she actively participates in the social life ... she achieves her best*
>
> (Mary, March 7, 2006).

Similarly, another student participant Saron, described a student who participates actively in classrooms as:

> *...Look, Hermela* [a student who participates actively in a classroom interaction] *is not... a 'Geek' ... Even if she stood first in the previous semester, she never forbids our rules...she consents to what ever we decide to do together.*
>
> (Saron, March 6, 2006).

I have had interviewed the above-mentioned student by the other student participant. She is active in the overall classroom interaction as well as in the social activities of the students. She doesn't believe that her participation in the social activities would affect her learning; she rather believes in balancing the two. I inferred this from her response as she claimed:

I like being with students who balance the two – real life and fun. If you are too much on your education, your mind wouldn't get rest ... this might lead to frustration... The other group, on the other hand, might make you lag behind, or may hinder the progress of your work on your education. This is not also good for them since it can make them wander around aimlessly.

(Hermela, March 6, 2006)

The students who belong to the group of the 'Geeks' do not participate in the social activities mainly because they are abided by the schools' rules. Social interest of students' is manifested in different ways – and, one of them is school celebration. In City Secondary School there are days to be celebrated like baby's day, father's day, and culture day and so on. Of all this days', culture day is the only day that is recognized by the school. Students are prohibited to celebrate the others. As I have informed that last year grade twelve students' were penalized for one month to not to come to School because they break the rule of the school. As Missionary School the school is very serious in such cases. Above all this, students organize programs without the school official approval however, the students who are considered, as 'Geeks' do not participate in these kinds of celebrations. Because of this, the majority condemn the students, who are called 'Geeks' as they see them strictly following the rules of the school, and do not want to break any of the rules contrary to their conduct. One student the 'Geeks' group asserts this saying:

...I personally do not like it... It is celebrated here without the permission of the school. And..., this makes the celebration unattractive than it could have been if the school had permitted. That is why I am not interested.

(Melat, March 10, 2006).

Besides, not wanting or not being interested to participate in the social activities with the majority students, the students who are called 'Geeks' are known for their strict behavior in their classrooms. For example, a student from this group stood up and shows respect while their teacher entered the class when others did not. As a result, the students who belong to the majorities make fun of such student. After observing this, I asked the student whether this act affects her behavior only to find out that it doesn't affect her in any circumstance.

> *I know they call me a 'Geek' ...I don't care. If I should stand when my teachers come to my class, I will do it. And I know... they are not happy with this.*
>
> (Beza , March ,10,2006).

On the other hand, the students who belong to the majority or the driving agent of the class norm understand that 'Geeks' have different interest from them, which makes them not to belong to the group- they avoid themselves. Accordingly, a student participant claimed as follows.

> (After a lot of hesitation) *there are students who do it knowingly. They are so stubborn* ዝም ብለው ችክ ይላሉ *I think... they have different... interest from us. They might like maths subject than we do... So, since they have a differed interest, we call them 'Geeks'. But I am not sure if they exist now. Because, they don't want to look different as I have already said*
>
> (Mary, March 7, 2006).

On the other hand, the students who are classified as the majorities have potential to mobilize the whole class. Even some times they can make their class ineffectual. For instance, Hermela whom students admire for

her contribution in the classroom interaction, together with classmates she can, however, make the class room interaction weak. She had the following to say in relation to mobilizing the class:

> *...We decided to keep silent whenever he [their teacher whom they don't like] asks...*
>
> (Hermela, March 6, 2006).

As I have tried to put it in a clear manner 'Geeks' could influence or dominate the classroom climate whenever they like. This has a great impact on the nature of classroom interaction.

4.3 Nature of Classroom Interaction and Its Implication

4.3.1 Verbal and Non-Verbal Interaction

The major goal of this study is to understand the nature of interaction in mathematics classroom. According to Bar-Tal and Bar-Tal, interaction involves verbal or non-verbal behaviors. The partaker interact one another by exhibiting behavior. Through the behavior, the communication takes place; as a result, meaning is constituted. (Bar-Tal and Bar-Tal, 1986, 135).

With this regard, my observation in City Secondary School, the most dominant ways of interaction are putting up hands, keeping silence, shouting together, getting up out of seat, leaving the classroom, murmuring and others. Whatever the case may be, the students give their own meanings while they interact with their teachers as well as with each other. Learners in City Secondary School usually raise their hands if and only if things get hard. Other wise they don't want to put their hands up because it is considered as the role of 'Geeks'. The

students think that putting hands up is just for those who can't see things as simple as possible.

> *...How come! I never raise my hand and answer....I am not comfortable with this kind of things (laughing).such things does not make me feel at ease* ለኔ እንደዚህ ዓይነት ነገር አይመቸኝም::
>
> (Mary, March 7, 2006)

In the above statement Mary clearly put her position that she does not like to raise her hand to answer or ask. She does not even want to think about it. For she thinks that is not her concern. She feels it embarrassing and shameful. As she said there are others who are supposed to put up their hands' and interact. Like wise, Genet seems uncomfortable with raising hands when she says:

> *I don't know why, but it is not my type to put hand up and answering* (long laugh) እንዴ. እኔ አልወደም ! *Really don't like doing this ...why I don't like it!*
>
> (Genet, March 10. 2006)

Although they say don't like raising their hands I observed that when ever they seek help from their teacher they show different signs to get him closer to their seat and assist them with their problems.

The other way of interacting with their teacher is through shouting together to show their dissatisfaction in what is happening. As I have mentioned above while I was discussing about tenets of the majority, students expressed their being uncomfortable, by shouting together. In the same way, students use different verbal or non-verbal behaviors to interact with the teacher or among them selves.

The other means is murmuring. Murmur is used to reflect their disagreement with their teacher. One of the FGD members shade light on this when they tell:

> *There is murmuring. If a student doesn't agree with the teacher, it is a sign of showing the disagreement you have with the teacher. For example, if the teacher is rough students do that all the time*
>
> (FGD, March 14, 2006),

As it is explained in the review literature part of this thesis, the vast portion of human interactions are symbolic. According to Delamont (1983) interaction involves interpretation (Delamont, 1983:27). As the individuals interact with each other they are constantly interpreting their own and others act. Every verbal or non-verbal behavior has their own meaning for both the teacher and the students too.

Like wise, silence too has meaning for the partaker in the interaction. With regard to this I can cite an incidence from my own experience when I was a teacher in City Secondary School before two years ago. One day, in one of my classes, the entire students' usually kept silent while I was discussing the polynomial function. Their silence struck me, and I asked them what was wrong. Then one of the students replied, "We were in the same manner for the last three days. And no one has asked us why. We have kept silent - with no question, and no reply even though we know that it is crucial for our learning.

Starting from that time I asked myself "Do we really care about our students besides solid subject matter?" Do students have their interest on the teaching – learning process? How do we interact with them? " These questions grabbed my interest and pushed me to study the interaction which goes on in a classroom.

So, silence is one of the natures of the non-verbal behavior, which takes place in classroom interaction. Students keep silent for different reasons. One of these reasons is to show that they are uncomfortable with their learning.

4.3.2 Rebellious silence

Students usually keep silent in their classroom when they got some thing unwanted. Accordingly, in some case students take measure to mobilize the rest. They think that, this is the only power that they have. In FGD discussion they stated an instance of this related to their previous teacher with whom they were not happy. As a result, they talked each other and then discussed with the administration to help them get a solution. However, the administration could not take any measure. Finally, they agreed to solve their problem by themselves refusing to take part in classroom discussion and to upset the teacher. Nevertheless, the teacher couldn't understand what was going on. This is apparent from the following excerpt I quoted from the FGD that shows the presence of rebellious action:

> *We had a ... teacher whom we dislike most ...it was boring to attend his class...Hence; we reported our problem to the office, but we could not get a solution for that. Therefore, we decided not to talk whenever he comes to class. We agreed and we did it.*
>
> (FGD, March 14, 2006)

We can point out from this that, it is very important for the teacher to understand the way the pupil in the class act. And he has to interpret their action accordingly since these are very crucial in meaning construction. Moreover, the teacher has to be constantly aware of what kind of experience to offer to his students and be sensitive to how they are making sense of what they are working on, what kind of thought goes

through their minds and what they are making of it. She/he also needs to be able to respond to his students in a way that facilitates their learning without trying to impose his own way of understanding them. This is mainly because, the student expects their teacher to know what they are doing and should be able to act accordingly. As one of the FGD member put

> *at that time the teacher should understand the silence – the unspoken words. The teacher should ask himself why they are keeping silent. Would they keep quite if they know it? He should think of teaching in other ways.*
>
> (Saron, March 6, 2006)

4.3.3 The Player in the Field

Pupils are expected to learn, and to behave in ways that facilitate their learning either sitting quietly observing the teachers activities or busing themselves in the teaching learning process (Delamont, 1983:77). This is because, learning is an active process in which the learner uses sensory input and construct meaning out of it. Learning also ultimately needs association with other human beings, teachers, peers, family members as well as acquaintances. Hence interaction in the classroom discussion is geared by the pupils experience, interest, and intention and so on.

- Pupils' experience

As learning is a social activity learner's act according to the social norm they constituted. Learners' exposure to the external world of the school environment is also very important in their learning. Regarding this Hermela forwarded her experience, which she believes has a positive

effect in her learning.

> *... I am the only one who asks questions; others don't as often as I do. I think it could be because the influence of the environment in which they grow up. Their environment did not teach them to interact. ... For example when I was in grade nine I used to work in the ECA ... I was the Youth Representative of Ethiopia. I was an advisor to the president. In advising, you need to communicate your idea effectively in accordance with the situation. Since I was active in that place, acting like leading discussions for longer time, I got used to face a number of people ... different kind of people; man, woman, young... So it was there that my fear disappeared... Because I have got used to talk in public, there is no way to be afraid of my teachers in a classroom. Some students might never get this kind of opportunity. I think I had many opportunities starting from home.*
>
> (Hermela, March 6, 2006)

It is not only the out side school environment that matters, but there are also other factors that matter too. From symbolic interactionist point of view, every time we enter to a new situation we learn how to behave by watching, asking, and listening (Delamont, 1983, 15). Accordingly, when learners are new to a school, they face a problem to act accordingly. They never take part in the first day of the school; rather they need time to adjust themselves. As one of the participants described her classroom environment, in relation to what she had experienced with the new comers who joined the school recently. One of the participants puts it as follows.

> *The schools status has differed from the old days. Seventy five percent of the overall populations are new comers – I don't know them and this has effect in the social interaction. My friends are in the science stream, so almost all my classmates are new to the school. And it is very difficult to interact with someone you don't know... I don't like how they behave– ጸባያቸዉ አልተመቸንም. They have some kind of odd behavior and I couldn't go along with this.*
>
> (Hermela, March 6, 2006)

On the other hand, as Hermela believes that she has better advantages over on those who joined the school recently mainly because they are not accustomed to the culture of teaching and learning process in the school she has the following to describe:

> *The school also helps you to be interactive ... there is much difference between students who have been educated in this school and who are new. Those of us, who have been here for longer time, have been used to work different things. After we were one class, we were asked to apply it by our teachers. So this has made us action takers than mere listeners. But it would be a experience for new comers to present in the class. They are not experienced with public speaking like most of us*
>
> (Hermela, March 6, 2006).

As aforementioned, the learning environment seemed different for new comers. And they need time to adjust themselves in accordance with the existing norm of the school. One of the classroom teachers also noticed the difference between the two groups. He pointed out that since the school has its own working environment, you could easily differentiate those who are new to the school from others.

...if you critically observe your students you obviously identify the new ones.

(Teacher, March 10, 2006).

- **Interest towards Mathematics**

In addition to accustom oneself to the school environment the interest the students develop towards the subject affects their interaction in mathematics class. A student participant contends with this.

...I hate mathematics. For me it is not interesting. I think it is not interesting to a number of students as well as. I feel that this is because of the nature of the subject. If it were to be read, you would read it. I personally don't enjoy the class

(Mary, March 7, 2006)

Moreover, students in social science stream believe that they are in this particular stream not because they like it; but just to escape from mathematics. Even though they said that they join social science to escape from mathematics, but they know they should take mathematics course. Some of the students join social science stream because they don't want to deal calculation in chemistry as well as physics. Genet who is one of the social science students remarked that she knows many students who joined social science because they don't want to deal with mathematics.

We, social science stream students have joined this stream not because we have drawn our life from it, but to escape from maths and physics ... I know students who have chosen the social

science stream only because they don't want to deal with math. Even though they want to be an engineer, knowing that they should deal with math, physics, they just...join this stream

(Genet, March, 8, 2006)

On the other hand, from the video recordings during classroom observation I noticed many students sitting with out doing the exercise given by their teachers. Some were chatted with each other; some laughed exchanging notes ... and one of the students talked on her cell phone. When I asked them why they did so, one of them justified herself saying that even her teacher knows that she doesn't like learning mathematics. She has the following to tell:

we say ...em it is nothing you don't have to take it seriously ምንም አይደለም ብለህ ታልፈዋለህ:: *we say we got something funny.* የሚያስቅ ነገር ተገኝቶ ነው ብለህ ታልፈዋለህ :: *just think that something to laugh at has happened here. Since the teacher knows, I don't like the subject he doesn't say anything. The teacher knows that I am not good in maths so, he says nothing.*

(Edom, March 10, 2006)

What I have understood from the students' reaction is that, their teacher's behavior has contribution. I said this because the students in the FGD claimed that their mathematics teacher is also aware of the situation that most of them were not interested in the subject, it is apparent that he taught them in a different manner from the natural science stream students. The teacher is also aware of the situation when he says:

Students in the social sciences are not willing to do Maths but history and geography. Even I have a different preparation for social science students
(Teacher, March 12, 2006).

On the other hand, there are students who enjoy learning the subject but who do not participate not to differ from their group. Regarding this Hermela can be a good example. She forwarded her response in one of the interviews as:

> *I like asking questions – almost arguing with my teachers. if I don't understand something, I never skip it. I ask until I got the point ... I ask the teacher privately.*
>
> (Hermela, March 6, 2006)

As saron told me, she has no reason to not to take part in the classroom discussion. Even she doesn't know why she doesn't participate. The following excerpt is taken when she explain why she does not participate in classroom discussion.

> *I don't know... may be if everybody participates in classroom, you won't fear to participate or to express yourself. But in a classroom where everybody keeps silent if you try to answer questions I don't think it's right* እንደ መንቀልቀል ነው የማየው

(Saron,march 6,2006)

While justifying why they seem to be totally engaged in other things in mathematics class, a student participant considered that the subject is not part of her life. She confirmed this stating the experience she had in her early years of school.

> *Mathematics is not essential for my life. If I believed like that it was essential, I would join the natural science stream. But I have never thought it is essential for my life...since my childhood days. I think this*

is the influence of the school in which I have been educated before I joined this school. I would be happy if I wouldn't think like this because when I compare myself with my friends, I feel as if I were in other school. I would have different kind of thought

(Saron, March 6, 2006)

On the contrary, some of them believe that mathematics has a greater impact in their life. But the main reason for their not being interested in it the way their teachers teach them and the way their textbooks are organized. One student claimed their teacher's failure short to present the subject as one part of life entity. Hanna, a student participant, has a strong stand on this. She believes that it is teachers', students' and curriculum developers' task to relate the subject matter with their life experience. She further noted out:

... the people who know the real maths, can see its every relation with life. But the student only knows working some problems and exercise according to the example given to him rather than relating it with real life. I think this is the first reason why we face difficulty in doing maths. The second reason is, for example, while we learn collision in physics it would be meaning less with out real life example. But we learned it by relating with real life situation that is how a car collides with things – going with high speed. If the person calculates the speed he would get the real time to collide... our physics teacher teaches us in this way. But regarding maths there is no this kind of teaching.

(Beza, March 10, 2006).

Regarding the above, as the Bulletin of International Commission on Mathematical Instruction asserts, Mathematics correlates closely with human life (Binyan, et al, 2001). It is suggested that mathematics can and should be learned in connection with the authentic life of the learners or their future life as the above excerpt stated.

Further, they argue that Mathematics instruction should be based on the introduction of situations containing problems originating from learners' life or real tasks they are likely to face in the future. Learners can thus have opportunities to learn, to identify, and to solve mathematical problems so as to adapt to the complex world and experience social responsibility (Binyan, et al, 2001).

The other problems that they mention is that mathematics is in born, as a result, they think they must be gifted to cope up with mathematics. Hermela well explained this idea saying:

> *Yes, sometimes I think, as it is a gift. In our class there were two sisters. One of them is average in everything but she was good at maths. Here the most amazing point is that she claims she has never studied it at home like she does other subjects. In exam she does well in maths. She is an outstanding student in maths unlike other subjects.*
>
> (Hermela, March 6, 2006).

Due to the reason I mentioned above and others, students fail to participate in classroom discussions. Students refrain from giving answers, asking and forwarding their suggestions. This mainly is because of lack of confidence, fear, being uncertain of the answer, for fear of challenges, not wanting to initiate class room interaction, lack of

motivation, lack of experience, their stay in the school are some from the many that I observed.

The participants explained that fear to interact is one of their major problems. Fear does not actually occur at this level spontaneously. It is rather a process and cumulative effect of their experience. Of course it is a generic term with different meaning. There might be fear to expresses ideas and some of them have fear to work or solve problems on the board. From my observation I have seen some students who do not even want to face their fears. They nod their heads while their teacher stares at them. Hermela backs up this idea briefly saying:

> *Most of the students are fearful to interact. Not only to asking the teacher but also presenting something they have been doing for some time scares them, if you ask them for explanation they fear to speak, to answer. I think this is matter of lack of confidence.*
>
> (Hermela, March 6, 2006).

The categorization in the class has its own upshot on the nature of interaction in class. It is always manifested in the interaction. Students exempt themselves from interacting in the class from the tendency that others will make fun of them.

> *"Even if I know the answer I don't want to go and work on the black board... mainly because students do not want to be called a 'Geek'. So, we keep quiet," says Saron.*
>
> (Saron, March, 6, 2006).

There are students to be categorized as "Geeks". Mary when she tries to explain about her exemption from classroom interaction, she never answers even if she knows the correct answer. She told me that she is

very much surprised by those who participate. What I also understand from her facial expression, being part of the interaction is something, which is comfortable. Those who participate are considered to be back to the news. Mary has the following to say:

> *I never answer even if I know the correct answer because; I hate doing it (long laugh)... It is weird to me (ይደብረኛል).*
>
> (Mary, March, 7, 2006)

Students do not participate even if they know the right answers this is because they don't want to act against the classroom norm. From the above excerpt what I learned is that if she answered for the teacher's question she may be considered to be against of the classroom norm. Mainly students do not want to be 'Geeks'. Of course this is not the only case that students abstain to participate in classroom interaction. Many things are observed and these are presented in the next part of the analysis.

4.3.4 The Role of the Teacher in Classroom Interaction

The following observations are directly or indirectly related to the role of the teacher that factors which affect classroom interaction. Teaching is a job but in becoming teacher one learn to occupy a role. The role of the teacher is determined by his professional qualification personal belief and the school policy therefore; the teacher act according to these three issues and a teacher always tries to compromise among the three. The role of the teacher has direct influence in the classroom interaction in the following section I put these effects in three-sub themes teacher as controlling pupil behavior and controlling as knowledge.

- Control over Pupil Behavior

In classroom interaction like any other interactions two or more participants could be involved. In my observation the teacher interacts with a single student, with group of students in the class and some times with the whole class. Mathematics classroom interaction is not only interpersonal but it can also occur in an inter group level.

My video recordings reveled that students help each other in solving problem given by their teachers. This can be a good example for students to interact with ach other to solve problems. As the student participants manifested, they ask for help of the teacher when they are unable to solve a certain problem by themselves. With this regarded, Saron, for instance, has the following to describe the matter and her own experience:

> *First I ask my friends. If my friend could not answer my question, I would forward the question to the teacher...but I do not want to bother the teacher as well as the whole class. That is why I first ask my friend for help*
>
> (Saron, March, 6,2006).

The other point is that students believe they need their friends' assistance if and only if their issues to be discussed are too silly. They are ashamed of asking silly question in class. Because they think they may waste others time. Saron remarks here:

> *But if I think it is a silly question I ask my friend who sat beside me. ... If I ask the teacher such question I am interrupted him as well as the whole class. I am afraid I might be the only one who did not get the point (laugh)...who lags behind.*
>
> (Saron, March, 6, 2006)

Another student, Genet, also shares this idea. She believes that she never asks her teacher if it is silly. She asks the teacher if only her friends could not do that.

> *...if my friend could not answer my question I would forward the question to the teacher. But I don't want to bother the teacher as well as the whole class that is why I first ask my friend for help*
>
> (Genet, March 8, 2006).

Unfortunately, students ask each other only when they think their question or problem would be too easy for the teacher. When they feel confident enough they solve the problem by their own, never discussing with their friends. So, this may block them from looking at things from other angles. Moreover, their interaction is bounded to a certain group; since they don't want to go around the group. Here since groups are formed with common interest, the group members–almost in all cases- have similar competence. For instance, an interview with Hermela shows that she never asks students who do not belong to her groups for help she reiterates:

> *I interact with students who are good at in maths; most of the time I interact with my friends...we ask questions each other. ... Most of the time we don't ask others*
>
> (Hermela, March 6, 2006).

On the other hand, teachers do not want students to discuss among each other for fear of disturbance. Of course the teacher should control the classroom learning. As Delamont states the pupils must learn what

they can and cannot, do and what academic work is expected. The teacher, therefore, must decide what her/his expectations and limits of tolerance are; and must define them to the class (Delamot, 1983:71).

In my observation, I have noticed that there is a norm, which is understood by the two partakers in the learning environment overtime. Accordingly, the students understand their teachers and act in line with to their teacher's interest. In the FGD discussion the student put in plain words that they know their teacher interest.

> *For instant we know what... he wants from us. He doest want to be disturbed while he is teaching... therefore we do not talk each other. But in case of the teacher (I omit the name), he wants us to talk while he is discussing. Hence we adjust our selves accordingly*
>
> (Genet, 8, 2006).

The staff and the administration of the school have standards about control. Consequently, to maintain that standard, teachers do not allow students to be 'noisy' in the class, because noise is considered as the symbol of losing control over the class. This was manifested in one of my observations: students were doing their class work discussing with each other while teacher kept on moving around to help them. Suddenly silence reigned over the class when, they saw the school director walking near their class.

It could be derived from this that, the teacher's demand and interest of controlling the classroom interaction comes from the rule of the school. On the other hand, the students stated that the teacher is the major reason for them to withdraw from the classroom discussion or interaction; mainly because keeping quiet is, a symbol of learning for that teacher in particular.

I don't talk with students while there is a teacher in classroom.

(Hermela, March 6, 2006).

However, since the teacher cannot control the overall behavior of students they interact with each other out of the sight of the teacher. Saron explained this saying.

We discuss things among each other. Sometimes while he is far away from me I ask my friend not to interrupt the teacher

(Saron, March 6, 2006).

- **Control over Knowledge**

The participants in the interaction influence each other. The teacher influences the students and the students also influence the teacher. I have tried to discus in the literature part; the leaner is seen as having the same agentive balance in the interaction as the teacher. The student is seen as active and influences the teacher, while being influenced by the teacher. On the other hand, in the former view of teaching, the teacher was seen as subject and agent on the contrary pupils were seen as the object and patient (Hicks, 1996:30).

Some times students dominate the overall teaching and learning process through the points they raise and questions they ask. This, it could be because of a number of reasons; for example, trying to relate the lesson with their previous one or with other subjects. From the video recording of classroom observation, Hermela can be a typical example. She dominated the entire classroom learning. She raised many of the questions in the classroom discussion this is recognized by other students as well. Saron explained this as;

Some students who are really clever dominate the classroom; For example, Hermela has potential, She works very hard; she participates in every chance she get. Knowing this, teachers also ask her to answer... because she makes them feel happy. What ever they taught she understands faster. They also ask the average students but they gets the correct answer from her only

(Saron, March, 6, 2006).

Unfortunately, as it is true in from my experience, in formal mathematics teaching, we, teachers in most cases raise points, which we feel are the most important, and which have high priority. We present the whole packed information in a condensed manner mostly to cover the textbooks on time. The more information the teacher delivers in a less time, the more she / he will be considered as a good teacher since covering the textbook is one criterion of teachers' evaluation. The students copy the information on their notebooks for they are demanded to retrieve it later on examination. Student participant also agrees the situation saying that she learns in order to manage only passing the exam.

Even when I learn I just learn to pass the exams and tests

(Saron, march 6, 2006)

However, Hermela prefers a teacher who gives more chance to learners to participate and be active in the overall teaching and to learning process. On the contrary, she doesn't like those teachers who teach only for the sake of teaching. The following excerpt is taken out from Hermela's description. Here she described how their previous teacher used to teach.

... the teacher used to teach just for the sake of teaching. He enters the class, explains some point, writes some thing, and leaves. That's all (ይማሬ

ያስረዳል፣ ይጽፋል ፣ ይመጣል፣ ቢቻ), the student would face difficulty to understand the subject matter... More than teaching the teacher should... check and recheck whether the students got the point he has already taught by asking different questions and giving different exercises and the like.

(Hermela, March 6, 2006).

Also in my observation, I saw students working together in solving problems. In most cases, I observed that the teacher discusses issues for about thirty-five minutes and gives them exercise on the topic discussed. Then students form groups to solve the problem, and the teacher moves around.

From the point of view of social constructivism students can learn with the help of others: adults or children, who are more advanced, grasp concepts and ideas that they cannot understand by their own. Unlike cognitive constructivists, teachers in social constructivism do not just stand by and watch children explore and discover; or like in the traditional way the teacher is not expected to deposit all information in the mind of the learner as if they are banks.

But the teacher may guide students as if they approach problems, may encourage them to work in groups to think about issues and questions, and supports them with encouragement and advice. Such kind of interaction, however, made the student get bored of learning. Genet expresses this situation as follows:

... He (their teacher) works out the question with out showing us the steps... and this is boring for us. The teacher at least should show us the steps clearly... Even though the teacher

teaches in a very good manner... anyhow it is not interesting for us.

(Genet,march 8,2006)

The student must spend time interacting with concepts. Each student must make their own idea by creating connections to previous knowledge, working through problems, determining what they do and do not understand and determining how this new concept can be applied to the future. Other wise the students get nothing from their learning and get board. No matter how teacher may teach, students may lack attention. Regarding this Mary has the following to says

no matter how he keeps talking, no matter what he is discussing you won't listen ***ቢለፈልፍ አትሰማውም*** *you just hear his voice with out grasping any point.*

(Mary,March 7, 2006)

Most of the time, teachers do not give chance to the student to interact with books to give suggestion and opinion on a given lesson. This situation also bores the students. Hanna manifested that she got tired of such nature of interaction in her mathematics classroom learning.

...When he repeats the lesson again and again oho... we rather get bored

(Hanna, march 8, 2006)

Further more, classroom as a group has a leader. The teacher is the leader of the class. Of course some times some students are more influential than even the teacher him/her self. The teacher's most potent resource is his/her possession of, access to and control over knowledge. He or she has knowledge and can define what should and should not be learned (Delamont, 1983:50). From the video I have observed that the teacher determined what should be learned and should not be learned.

The following is one of the examples of what I observed. The teacher posed a question to be answered by the student on the board. No one volunteered to do, but Frehiwot. She did every thing on the board. However, while she was working out or solving the problem the teacher was cleaning the board, and he didn't see that she has already finished her deeds and took her seat. Finally, the teacher looked at her deeds and appraised what she did. Then he went over the whole thing and did it in a different way, but he arrived at the same answer.

The point here is that the teacher did the same thing in different way. He didn't allow the student to copy her deed. From this what one can infer is that the teacher is the one who decided what should be copied. Rather he wanted them feel they need help. He thought that they have nothing to contribute in the teaching learning process.

> *Most of the time our teacher advices us here that he does not demand answer from you ...While he teaches us he always tells us to tell him when we have problem, or if we don't understand...what he is teaching.(thinking for a while) He tells us he*

can repeat it. if we didn't get the point but the problem is we do not get the point

(Hanna,March 6,2006)

- Encourage and Initiate

In most mathematics education the teacher asks question and students answer. Then the teacher says "no". This is the way how classroom learning is conducted. Consequentially the students think that there is only one correct answer for question, and they feel that they have to it. Hermela had her own experience on this.

I used to interact with the teacher a lot. I used to ask the teacher the difference of his and my answer and why it didn't match. So, I used to ask him to do the example the way I have done. I used to argue a lot. But he didn't want us to challenge him. He just told us to work on his way without justifying why

(Hermela, March 6, 2006).

Second to this that most of the time teachers seek for the right answer. As the FGD members explained from their experience, the teacher needs to ask those who can give them the right answer.

The teacher always looks for students who are attentive to him. After finishing his teaching, he usually asked the students whom he thought would answer in a good manner... he wanted to make sure students have got his point...But if that student couldn't answer the question, the teacher would think that his lesson was not clear enough. The student whom the teacher favors is some one who understands faster than others. The problem lies on generalizing the whole class with one student.

(FGD, March, 14,2006)

Similarly, some times teachers think that students are careless for their own learning. As one of the schoolteachers explains the students used to fiddle about their education. He further claimed this saying the following.

> *You might have tried your best to teach them...But the moment you get into the class they turn your good day to a bad day...They are not ready to learn... they mock of what you do*
>
> (Teacher 1, March 16, 2006).

On the contrary, students claim that their teachers do not encourage them. The FGD members cited an instance to explain this. Their teacher once asked them to answer a question, and they replied together by saying "maximum" and one of the students in the class replied by saying "minimum". As they explained, the teacher forced the student to get out from his class because of missing the right answer. Hanna, therefore, recommended the following

> *Teachers play vital role in this point. They should not discourage students when they answer something which the teacher hasn't expected, but the student thought is right...The teacher should not show some strange face, or laugh and make students laugh- even if he doesn't say it. ...There are also students whom the teacher doesn't give a chance to answer even though they raise their hands. So the students become tired of it and drop trying to answer questions*
>
> (Hanna,March 8, 2006).

Generally, the teacher needs to encourage the student and support them. This is the idea of constructivism and what is meant to be a constructivist teacher. The purpose of constructivist teacher is to make the students think for themselves, but not to tell them what to think.

Hanna believes that students should try by themselves, and she seeks for time to think by herself. To put it with in her own words

> *... if the teacher doesn't get upset even though your answer is not correct, encourages you to answer without worrying about anything... however there is a teacher who even cuts marks if you don't get the correct answer.*
>
> (Hanna,March, 8, 2006*)*

In analyzing classroom interaction in City Secondary School, what I observed is that teaching mathematics is not some thing, which is isolated from the existing social norm. Rather classroom norms have their own impact in the teaching learning process. The schoolteacher in general and mathematics classroom teacher needs to know how students act in classroom discussion and why do students prefer to act that way? This is very important in improving classroom teaching.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND IMPLICATION

5.1 Summary

This qualitative case study investigated the nature of mathematics classroom interaction and factors affecting interaction. I sought to understand how students interact in mathematics classroom discourses with their teacher and among themselves.

Social constructivism and Symbolic interactionism were used as tools to understand the interaction process. Social constructivism emphasizes the importance of culture and context in understanding what occurs in society and constructing knowledge based on this understanding (Derry, 1999; McMahon, 1997 cited in Kim). This perspective is closely associated with many contemporary theories, most notably the developmental theories of Vygotsky and Bruner, and social cognitive theory (Shunk, 2000 cited in Kim).

I took symbolic interactionism as a theoretical lens to understand the nature of interaction. A symbolic interactionist framework focuses on how individuals interpret and give meaning to their experiences, to other people, and to "objects" in their lives and endeavors to understand how this process of interpretation leads to particular behaviors (Jacob, 1987 in Thompson, 2000). In the case of my study to mathematics classroom interaction, I have tried to see how students give meaning to classroom interaction and constitute their classroom norms.

Symbolic interactionism is a perspective that argues meaning is constituted as individuals interact with one another. Proponents of this perspective further argue that it is essential to consider the nature of the

interactions that occur in the mathematics classroom. Explicit attention to classroom social and socio-mathematical norms and to classroom discourse can result in advancing children's development of mathematical argumentation. As children learn to explain and justify their thinking to others, they develop intellectual autonomy, and in the process, mathematical power (Yackel, 2000). This was the justification underlying the decision to employ this perspective for analyzing the data generated in this study.

The study was designed in such a way that a case was selected to explore the nature of interaction in mathematics classroom. This study is a single, descriptive, and instrumental case. Purposeful sampling was used to select eight students and one teacher from City Secondary School. Data were gathered using qualitative methods through personal observation, interview, and field note. These data were analyzed using interpretational analysis techniques. Accordingly, themes were emerged and analyzed from the generated data. From these themes general findings were drown.

5.2 Conclusions

The finding, from extensive observation and in depth interviews with participants, reveals that the social norm of the classroom is a significant factor, which affects the mathematics classroom interaction in City Secondary School. The learning environment was restrained by the classroom social norms. Furthermore, I understood that classroom as social setting has its own norm and the norms have consequence in classroom interaction.

Based on these norms, the classroom is fractured into subgroups. Students were interacting with their teachers as well as their peer groups according to the constituted norm, which encouraged them to remain silent. The majority of the class is lined by the constituted rule. However, some students are not willing to obey the social norms. As a result, others call them 'Geeks'. 'Geeks' are very interactive as contrasted to the rest of the class.

Besides, the classroom interaction was influenced by several factors. The following are some from the many factors were found to be significant in influencing the nature of interaction.

- Lack of confidence
- Not to be considered the only student to initiate (not to be willing) interaction
- Feeling embarrassed
- Being uncertain of the answer
- For fear of challenges
- Lack of enjoyments in the subject, teachers and classmates
- Lack of motivation
- Not to be called 'Geeks' or nerds by others
- Lack of knowledge in particular area

- Facing discouragement
- Teachers and peers expectation and
- Having less chance for participation.

The findings, from all the data sources, show that there are about seven different methods that the students use to initiate interactions with their teacher. The different methods include putting up their hand to attract the teacher's attention, getting up out of their seats to go and see the teacher, calling out the teacher's name simultaneously, answering together, shouting together to show that they are not satisfied in what is going on, keeping silent, murmuring and waving their hands and calling out the teacher's name.

The most common of the seven methods implemented is answering together. In case of classroom interaction, students are not willing to participate on an individual basis. Rather they prefer to act together. The reason behind is that if they participate frequently they could called 'Geeks' (አካብያ). Most of whom don't like to addressed by this name.

The findings also showed the purposes of the students' interactions. There are different purposes of interaction and they include to check with the teacher to see the correctness of their work, to ask the teacher for help, answer to a teacher-directed question, to ask a question of their own and finally to offer advice to other students in the class. And regarding peer interaction, to ask for help, to copy solution from others and to talk about different issues regardless of the subject mater.

5.3 Implications

The purpose of this study was to examine the nature of classroom interaction in City Secondary School. Classroom interaction is a key process in knowledge underpinning and cognitive development. As classroom teaching and learning process take place by means of interaction, its importance is unquestionable. However, the finding revealed that student-teacher interaction seems passive.

Interaction is a joint action in which both the teacher and student involve and influence one another. Therefore, an active involvement of both parties is imperative. Accordingly, for active and dynamic involvement of both teachers and students in City Secondary School I suggest the following.

- Students need to be helped so that they understand the importance of interaction in classroom discussions. Since the students seem to be unaware of the inevitability of classroom interaction in mathematics learning. The teachers with the school administration can arrange different opportunities for discussion on the needs of classroom interaction.

- Students seem irresponsible for their learning. They passively receive knowledge from books and teachers and they had assumed of not being responsible for their own learning. Consequently, they need to be helped to understand the importance of active participation in classroom so that they would take a decisive role in their overall learning. As a result, they become critical thinkers who do not passively receive information rather, become information seekers. This can be done by

including questions, which seeks students' creativity in the classroom works and test.

Classrooms are part of a wider community of school and beyond socio-cultural setting. Classroom environment has cultural practices and social norms. Therefore, in classroom mathematical, educational and social acts as well as combination of these activities happen. As the findings of this study revealed, students constitute a social norm, which has a negative impact on their learning. This norm has not only constraints on learning the subject matter but also it has constraints on the individual learners' behavior that challenge individual perceptions. Individuals are expected by the majority to act according to this norm. Hence,

- From both the administration and teachers' side there is a need to understand the constituted classroom social norm so that this situation would be improved for the betterment of the teaching and learning process and students would benefit from it.

- There is a need for reconciliation and create platform for learners which can lead to social mediation of individual knowledge. Through discussion or argument, the participants negotiate new positions, which can lead to share meaning developing. It involves making an effort to listen to and understand other perspectives. As a result, common or 'taken-as-shared' meanings develop in classroom.

Moreover, teachers come to classroom with certain attitude or perception about their learners and act accordingly. As the finding revealed, teachers assume that social science students are not interested in mathematics learning. And this has affected their teaching negatively; teachers give less chance for the learners to construct knowledge by their own rather than helping students to change their attitude towards the subject. Hence,

- Teachers need to use the information and conception in constructivist way that they have regarding their students. Having this conception they may help their students to understand the subject matter in a natural way by encouraging learners to participate in the overall teaching and learning process.

Besides, students seem to take their own major to solve problems they face by not involving in the classroom interaction. This appears to strongly affect negatively their learning. Thus,

- The school administrators and teachers need to understand and be empathetic to the students' problems and respond accordingly. For the effectiveness of this suggestion the school may use the student counselor, classroom monitors and home room teachers.

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APPENDIX A

INTERVIEW GUIDE

First and foremost, I would like to offer my heartfelt appreciation and gratefulness to all staff members of City Secondary School. Especially, may my thanks go to you, who participate in this research work.

This interview guide is prepared for Mathematics teachers and for college preparatory students in City Secondary School. My research topic is Mathematics classroom interaction in City Secondary School

According to different educationalists, classrooms are extremely busy environments where in a single classroom; teachers could find themselves engaging in more than thousand inter-personal exchanges with their students (Jakson, 1968). This is commonly referred as Classroom Interaction. Classroom interaction is meaning making process of communication between two individuals and amongst persons. Therefore, interaction is one of the most important components of any learning experience (Dewy, 1938, Vygotsky , 1978 in Vasidas, 2000:1).

The construction of knowledge goes beyond the interaction between teacher and students to wider interaction among students themselves in the social and cultural environment of the classroom and even beyond that. But in this study, the focus will be students, teachers and peers interaction taking place in a classroom. According to Robbinson, interaction is defined as the process referring to "face to face" action. It can be either verbal, channeled through written or spoken words, or non-verbal, channeled through touch, proximity, eye contact, facial expression, gestured (Robbinson, 1994:7).

Ethical Issues during Interview

- Participation in this research study is on voluntary bases. You are allowed to draw from this research study anytime you want.
- I will give you honorable chance to ask about the study either before participating or during the time you are participating.
- All information given to me is secured. I will use the information, which you are going to give only for this particular research purpose.
- Observation, understanding and interpretation belong to me and information given belongs to you. I have the right to interpret by my own subjectivity.
- I will request your permission to get the discussion recorded, and also give the chance to edit in case if you change your mind on the discussions.
- I will never use your right name unless you permit me to do so.
- I have a room to negotiate on the code of ethics. Through negotiations and discussions we can add to or subtract from the above code of ethics.

Issues to be raised during interview

Participant's Background.

- Educational, personal, experience,

Interaction in Classroom

- How classroom interaction takes over?
- What factors affect your interaction? Why?
- Interest in participating in classroom discussion.
- Interest towards mathematics.

Thank you again.

APPENDIX B

ETHICAL CONSIDERATION

The following ethical issues were considered through out this study, in data gathering and analysis of the study.

- I will give an honorable chance to ask the study either before participating or during the time you are participating.
- It is voluntary research participation .I allows them even to draw from the research any time they want.
- All information given to me is secured. I will be used only with their permission and for the research purpose only.
- Observation, understanding and interpretations is belonging to me and information given is belonging to them I have the right to interpret by my own subjectivity.
- I lake their permission to get the discussion recorded, and also give the chance to edit if they change their mind.
- I will never use the right name of unless they permit me to do so.
- I have a room to negotiate on the code of ethics. We can add or subtract the above code of ethics with my participant discourse.

Andualem Melesse