

Chapter-I

INTRODUCTION

Background of the Study

Mathematics is defined as the science of quantity and space. It is a systematized, organized and exact branch of Science. It is the numerical and calculation part of man's life and knowledge. It helps man to give exact interpretations to his various ideas and conclusions. It is a science of logical reasoning and numerical problems. It deals with quantitative facts and relationships as well as with problems involving space and forms (Sidhu,1975). Mathematics is a way of thinking, a way of organizing, analyzing and synthesizing a body of data. It is the study of patterns .It is through mathematical description that regularities and similarities in nature can often be classified. Mathematics is the language of science and as such uses carefully defined terms and symbolic representation that enhance our ability to communicate. Mathematics is an organized body of knowledge in which each proposition follows as logical consequences of proved proposition or assumptions such mathematical structure is characterized by undefined term, assumptions and rules of logic. Mathematics is an art. As in other arts characterized by order and internal consistency. Mathematics is Queen of all sciences. Thus mathematics is a body of knowledge in the area of science, with its own symbolism, terminology, contents, theorems and techniques.

Mathematics directly deals with the human life. It is believed that development of mathematics and development of civilization go together. Mathematics was created to fulfill human needs. It had been developed simultaneously with the development of

society. Mathematics is not only taught and practiced through the formal institution but the contemporary societies have also been practicing it with its own ideas and belief (Ernest, 1991). “Mathematics is the Science of number and space.” (Advance Learner Oxford Dictionary, 1995).

From the past Mathematics as a very essential discipline in the teaching and learning by giving the great emphasis for mathematics. In the middle periods it has been included in ‘Trivium’ and ‘Quadrivium’ through Logic and Arithmetic/ geometry respectively. Latter different curriculum has great emphasis towards the knowledge of mathematics. Till now mathematics has strongly occupying a large place in the curriculum of elementary level to the higher education. Thus Teaching of mathematics is developing with one of the core concern in education system and has huge responsibility towards the teaching and learning for the modern world. This is the concerns of the Mathematics Education. According to James L Hill mathematics Education aiming:

- To teach up to date mathematics including probability, Statistics and Numerical value.
- Concept and fundamental structures.
- To develop conceptual meaningful mathematics as well as efficient computational skills.
- To show Mathematics both as an abstract, autonomous body of knowledge and as a useful operational tool.
- To show mathematics as an ever expanding open subject.
- To present a clearer picture of methodology in mathematical activity.

- To pay more attention to develop motivation and positive attitude about mathematics.
- To define mathematical literacy for the average citizen in our society.

Educating mathematics is not only reading writing, Arithmetic, It is not only the role of content, and it is the way to empowering critical knowledge is called a simply mathematical knowledge.

Mathematics education is not just a complex collection of skills, concepts and ideas that we endeavor to pass on the next generation. Many children enjoy mathematics- usually more so between the age of 5 and 11 then 11 to 16 it has to be said, but there is another story! For many pupils, mathematics is a series of challenges and hurdles which they face with passion and determination. For many others however, mathematics is a daily experience of continued failure and irrelevance. Mathematics education fails too many children; it fails children on the margins of society, it fails children from ethnic minorities, and it fails children from social and cultural background that are different from the majority of mathematics teachers (Gates, 2001).

Here is some consideration in teaching of mathematics; It is assumed that;

- The children can learn more than we think they can.
- A better curriculum and better teaching can accelerate the transition from one stage of the learning to the next. And
- The early use of the concepts of mathematical structure accelerates learning by simplifying and unifying the subject matter.

Teachers have access to lesson write ups and additional material to integrate these activities effectively. Lesson should lead themselves to inter disciplinary activities; student centered and task-oriented, it embraces active learning, constructivism and project based activities, while remaining true to the standard, higher level thinking skills, such as analysis, synthesis and creativity are encouraged as well as technology skills and social learning's (www.realworldmath.org).

Nepal in its Vedic era (3000 BC) 'Gurukul' provided the education including mathematics for reckoning, Astrology (JytishShastra) and other purposes like ruling the state, farming, trading etc. afterwards different historical periods mathematics was developed and utilized. But the formal schools and particular subject mathematics is adopted very latter in school system. But in university mathematics started in 1918 AD in intermediate level. Now the formal study of mathematics is wide spread through the modern education system.

In the age of globalization and technological world Nepal also not isolated from the modern trends and cultures in education system, particularly in mathematics education. Nepal has its own developmental history and different phases towards the modern education system. Till now, Nepal gets lots of development through its national efforts as well as international programs like Education for All (EFA), School Sector Reform Plan (SSRP). The historical development of entire school system plays important role towards the mathematics education. The countries' socio-economic conditions and the innovations of science and technology in the society and the existing educational status influence their goal towards mathematics education. Nevertheless, mathematics is taught

in all levels of education in every country in the world. The history of mathematics reflects some of the noblest thoughts of countless generations.

Nepalese mathematical system is highly influenced by the development of world's mathematical system. Curriculum structure and subject areas of school curriculum according to the National Curriculum Framework for School Education in Nepal; Compulsory mathematics has been included in the curriculum as a compulsory subject from class 1 in school as per its importance. In grade 1-3; Mathematics curriculum is based on integrated curriculum, an activity book covering the major areas of learning. In grade 4-5 mathematics as a compulsory subject till the SLC. Sets, Arithmetic, Mensuration, Algebra, Geometry, Trigonometry, statistics, Probability are included in the curriculum with subject matter. In high school mathematics as an elective subject. Then after mathematics starts with its disciplinary approach to the university level.

In secondary level objectives of mathematics included: To solve behavioral problems of daily life and to develop mathematical skills, to develop basic mathematical concept, skills and knowledge for study of other subject, to motivate and enjoy mathematics, to develop mathematical knowledge, skills and capacity for higher studies.

There are radical changes in learning of mathematics. We can also find considerable changes in the contents of teaching mathematics and significant shift in teaching learning method. With the modernization of the world there are lots of facilities and resources are introducing in the education system. By these causes there is need to be change in the patterns of identifying the learners. Which is accepted by the different approaches in mathematics education. We can find the constructivism, constructionism,

individual interaction method, project leaning, collaborative teaching, engaged learning etc. as the latest learning theories in mathematics education. To applying these theories in teaching learning identification of the learners is most basic and essential. This is the study to identify the learners' participation in mathematics learning.

Statement of the Problem

Participation of the students in mathematics education is an important dimension to enhancing quality and relevance of education. Mathematics is the primary root of education system. Education develops the human resources, which are interpreted as a process of increasing the knowledge, skill and capabilities of all people in the country. But, in the context of Nepal, all people do not get the chance to be educated due to Social, Economical and Cultural problem (Acharya, 2011). Now a days it is well improving but not sufficient. Students are still facing lots of challenges especially in mathematics learning which causes low achievement in mathematics. In the mathematics classroom or out of the classroom the way of engagement of students like regularity, pre knowledge in the subject matter, students' activities towards learning, motivation and guidance, usage of resources like book, exercise book and other accessories, collaboration with peers and teachers, environment and culture etc. plays a vital role in mathematics learning. In teaching learning of mathematics there are rapidly raising lots of the issues for change and development. But change is not the easy process. For change there is need of well-defined paradigm. But in our context it is still following traditional concepts and teaching learning activities. On the other hand lots of changes taking place in the society and technology which obviously affects the way of participation and presentation of the students in learning process. There are raising different issues

regarding on the way of participation in learning mathematics. This research was conducted to find out the answer of the following questions regarding on the students' participation in learning mathematics.

The aim of this research was to find out how the students were involving in the mathematics learning at the school and out of the school in mainstream education in Nepal.

Objectives of the Study

The overall objective of this study was to find out the participation of the students in mathematics learning in mainstream education system at secondary level in sub-urban area of Sankhuwasabha district. Regarding on this objective, the study was focused on:

- The engagement of the students in mathematics learning at classroom.
- The involvement of the students in mathematics learning at home.

Research Questions

This study was conducted within the frame of the following research questions.

- What was the conditions of students' participation in mathematics class?
- How the students were participating in mathematics learning at the classroom?
- How the students were involving in mathematics learning at home?

Significance of the Study

Since the world now has become a global community. The Nepalese community cannot live in isolation. We have to cope our challenges and need to stand upon our reality. If we try to meet the challenges, significant change in education needs to occur.

Nepal's education sector suffers from several constraints that affect its efficiency and effectiveness. The educational reforms seemed to be able to convene the public of the benefit of change and all the efforts made so far have not brought desirable change(Adhikai,2007).

The SLC result also indicates that maximum number of students fails in mathematics. In school level, dropouts and failure are still in large number. Mostly the subject mathematics is charged for the causes of failure and dropouts. But there is not enough study related to the holistic approaches in the field of students participation in learning mathematics that uncover the issues/problem in their schooling and learning. Educational act and government policy is also practicing to improve the school's performance and inclusiveness of the different societies, Public involvement in school management. But these works are not enough to meet their goals. The case of the learning is not becoming well. From the side of the learner there is no any concrete contribution and expectation are proposed. So the research is becoming an important door to meet the expected desired.

The advancement of the science and technology has made the world very complex to understand which also influencing the attitude of the learners and their expectation. In that situation learning theories of the present day world have to meet and address such challenges of learners. The education system should provide proper guidance for the learners. To catch the pace of time it is very necessary to understand the learner. For this it is need to be known about the students' perception towards subject matter, engagement on learning activities, acting and performing towards learning, their attempt towards mathematical contents and showing their skills at curricular and co-curricular activities

etc. This is why the study on ‘Exploring the Participation of students in Mathematics Learning’ had undertaken with the following major significance.

- The most important aspect of the study would be that how the students were taking part in mathematics learning at school and out of school.
- This study also provides the information about performance of the students in mathematics learning.
- This study helps mathematics educators to identify the learners according to their motivation level, characteristics of students towards learning mathematics, efforts towards learning and their beliefs, capacity to use resources and materials and learning outcomes towards mathematics learning.
- This study opens the door for the further study about learning styles of the students in mathematics

Delimitation of the study

This study was confined to a single public secondary school of Sankhuwasabha district. The case school was selected in accordance with researcher’s convenience. So the result of this study could not be generalized elsewhere but may correlate with the same periphery. This being a work for the requirements of a study obviously is constrained by time, resources and study capabilities. Direct observation, In-depth Interview and study of related documents were used as tools. The study focuses only on the how the students were acting and performing towards learning mathematics at school and at their home in sub-urban area.

Operational Definition of the Terms

Participation

The students' act of taking part in mathematics learning or how the students become involving in the mathematics learning at school and out of the school refers participation in this study. Overall, participation in this study is defined in terms of way of engagement of the students in mathematics class and involvement of the students in mathematics learning at home.

Engagement

The engagement of the students in mathematics class refers time spent for mathematics learning experience in school, regularity in the class, bringing all needed materials to class, being in seat and ready to work when the class start, respect and politeness with peers and teacher, proper usage of the materials needed and obeying all school rules, steps for an activity or how learning tasks were accomplished in classroom.

Involvement

The involvement of the student in learning mathematics at home refers time spent for studying mathematics at home, guidance of parents and elders, home environment for learning mathematics, attempting the homework and assignment.

Learning

Learning is the process through which experience causes permanent change in knowledge. Learning is relatively permanent change in behavior due to the result of experience, training or practices. In this study Learning concentrated towards the

achieving specific objectives of the mathematics curriculum of the secondary school in mainstream of Nepal.

Learning Styles

Characteristic approaches to learning and studying. That is ways to studying and learning mathematics literally known with 'learning preference' also. Mostly learning style refers when, where, how and while do student study best. Applying materials and resources for the study, who are helping to the study, how do students doing their class work and homework etc.

Performance

The observable tasks which are showing by the students when attaining the learning experience and the activities shown by the learners after the completion of the specific learning tasks. In this study performance is accounted in terms of physical aspect, psychological aspect and cultural aspect are accounted which are detecting on the learners with its subjectivity.

Objectives of Mathematics

Which refers the grade wise objectives of mathematics in grade eight and nine provided by CDC, Nepal.

Chapter-II

REVIEW OF RELATED LITERATURE AND CONCEPTUAL FRAMEWORK FOR THE STUDY

This section includes review of relevant literature and the theoretical framework for the ongoing research. The review of related literature deals with the theories and research studies which have been conducted earlier with resemblance. It helps to conduct the new research in systematic manner by providing the general outline of the study. It includes review of empirical literature, theoretical framework and conceptual framework.

Empirical Literature

Each and every research work requires the knowledge of previous background to open the targeted objectives and to validate the study. Here, this section is an attempt to review the related studies, articles and the reports of the thesis. It was the continuous process until the end of the study.

John Marshall (2006) carried out a research on “The Teacher as Facilitators. What autonomy-Supportive teachers do and why their students benefit.” He says that students are sometimes proactive and engaged in classroom learning activities, but they are also sometimes only reactive and passive. Recognizing this, the researcher argues that students’ classroom engagement depends, in part, on the supportive quality of the classroom climate in which they learn. According to the dialectical framework within self-determination theory, students possess inner motivational resources that classroom conditions can support or frustrate. When teachers find ways to nurture these inner resources, they adopt an autonomy-supportive motivating style. After articulating what

autonomy-supportive teachers say and do during instruction, he discusses three points: teachers can learn how to be more autonomy supportive toward students; teachers most engage students when they offer high levels of both autonomy support and structure; and an autonomy-supportive motivating style is an important element to reeve a high quality teacher student relationship (Baral, 2007).

Deal and Peterson (1990) define school culture as deep patterns of values, beliefs and traditions that have been formed over a course of the school history.

Heckman (1993) brings the ideas of school cultures/climate home to education with the definition as the commonly held beliefs of teacher, students and principals.

Researches support that positive and healthy school culture/climate correlates strongly with teacher productivity, morale and satisfaction as well as student achievement.

According to

Stolp (1994) among five dimensions of school culture and climate there is mostly focuses to the learner's side. For good learning culture 'A space to learn in a structured manner (tutorials)' (Adhikari, 2007). Which highly advocates the way of students specified Participations.

Bourdieu (1998) argues in "Reproduction in Education, Society and Culture", that students who are from power and privileged class, doubles their knowledge in the school activities, although they get some exposure in the learning. In other words, the privileged class students easily decode or internalized message delivered in the classroom. He states, "the higher the social class of the family the closer the culture it transmits is to the dominant culture and greater the attendant academic rewards. The children who learn to

learn in one culture i.e. home may face difficulties learning in another culture i.e. school. Certainly the school environment, teaching procedures, teaching styles of teachers, classroom activities and encounters with different unknown person would be difficult to children that might create confusion for them. This indicates that the particular cases should be identified for the learners' learning.

Chesler and Cave (1981) state that when a child enrolls in a school, a formal educational setting. S/he encounters with new and different unexpected circumstances, as s/he has to interact with children and teachers of different cultural backgrounds. For the first time s/he feels a big differences which is again widened up by the rules and regulations of school, teaching styles as s/he inherits he/his traditional cultural values, norms and beliefs through her/his family and community as an enculturation process.

Norma Loft House (1993), Aboriginal Education Enhancement Branch, Ministry of Education using tools ERIC (Educational Resources Information Center) database indicates that the child success in school is significantly influenced by having:

- High degree of parental involvement.
- Teachers who understand different cultures and background recognize student's differences and provide a sense of inclusiveness for all students.
- Teachers with high expectation for all students and who encourage habits of positive self-regard.
- Learning activities that are relevant to a child background and cultural beliefs.
- good, research based institutional practices:
 - ✓ teaching students how to learn

- ✓ use of direct instruction where appropriate
 - ✓ instruction adapted to students learning needs
 - ✓ classroom which have positive peer interaction
 - ✓ cooperative learning
 - ✓ mastery learning
- An environment when hard work and personal responsibility are valued.
 - Safe, orderly learning environment and classroom that are well managed with clearly understand purpose and disciplinary rules.
 - Classroom which focuses on learning and maximize time spent academic tasks.
 - Teacher who provide encouragement and recognize accomplishment
 - Frequent and systematic monitoring of academic progress.

Thus from the above literature review, it can be deduced that the learner or the student are in the focal point in the entire education system. Hence well identification of the learner is very primary in education system. Some studies have been carried out in the field of Participation in learning mathematics but actually in this presented settings the study 'Exploring the Participation of Students in Mathematics Learning' is descent.

Theoretical Framework

Theory integrated statement of principle that attempts to explain a phenomenon and make predictions (Woolfolk, 2008). Theory is the tool for building a better understanding of the teaching and learning. But the scientific meaning of theory is quite different. "A theory in science is an interrelated set of concepts that is used to explain a

body of data and to make predictions about the results of future experiments”(stanovich, 1992, p. 21; Woolfolk, 2008).

Persons engaged in school mathematics education seek new ideas about the way children learn by consulting psychological research (Upadhyay, 2067). The different theories of learning should not be viewed as a set of competing theories, one of which is true and the others false. Each theory can be regarded as a method of organizing and studying some of the many variables in learning and intellectual development, and teachers can select and apply elements of each theory in their own classes (Bell, 97). Because no one theory offers all the answers, it makes sense to consider what each has to offer.

The researchers introduce the theoretical discussion, which is relevant for the interpretation of the findings of the study. There are various theories related to children’s learning and development. For this study the Constructivist views of Learning had been used for the interpretation of the findings of the study but other ideas could not be excluded.

Constructivist views of Learning

Constructivism is the view that emphasizes the active role of the learner in building understanding and making sense of information. Constructivist perspectives are grounded in the research of Piaget, Vygotsky, the Gestalt psychologists, Bartlett, Bruner as well as the educational philosophy of John Dewey, to mention just a few intellectual roots (Woolfolk, 2008). One way to organize constructivist views is to talk about two

forms of constructivism; Psychological and Social construction (Palincsar, 1998; Phillips, 1997).

Psychological/Individual Constructivism

Psychological constructivists “are concerned with how individuals build up certain elements of their cognitive or emotional apparatus” (Phillips, 1997). These constructivists are interested in individual knowledge, beliefs, self-concept or identity. They all focus on the inner psychological life of people (woolfolk, 2008). Piaget’s kind of constructivism as a ‘First Wave Constructivism’. Piaget’s theory focuses on the individual and psychological sources of learning.

Vygotsky’s Social Constructivism

Vygotsky believed that human activities take place in cultural setting and cannot be understood apart from these settings. One of his key ideas was that our specific mental structures and processes can be traced to our interactions with others. These social interactions are more than simple influences on cognitive development—they actually create our cognitive structures and thinking process (Palincsar, 1998). In fact, Vygotsky conceptualized development as the transformation of socially shared activities into internalized process”(John-Steiner & Mahn, 1996). Two themes how social processes form learning and thinking: the social sources of individual thinking and the role of tools in learning and development, specially the tool of language is examine in Vygotsky’s writings(Wertsch,1991;Wertsch & Tulvisite,1992;woolfolk’2008). Socio cultural theory emphasizes role in development of cooperative dialogues between children and more knowledgeable members of society. Children learn the culture that is ways of thinking

and behaving of their community through these interactions. Vygotsky believed that, the Social interaction, cultural tools, and activity shape individual development and learning. Putting learning in social and cultural context is ‘Second Wave Constructivism’. A focus on the social and cultural sources of knowing, as in Vygotsky’s theory.

According to Vygotsky’s constructivism Knowledge is constructed with the following assumptions about Learning and Knowledge. “Knowledge is constructed based on social interactions and experience. Knowledge reflects the outside world as filtered through and influenced by culture, language, beliefs, interactions with others, direct teaching, modeling, guided discovery, teaching, models and coaching as well as the individual’s prior knowledge, beliefs and thinking affect learning.

Given table gives the summary of constructivist views of learning.

Views about	Psychological/Individual Constructivism[Piaget]	Vygotsky’s Social Constructivism
Knowledge	Changing body of knowledge, individually constructed in social world Built on what learners brings	Socially constructed knowledge Built on what participants contributes together
Learning	Active construction, restructuring prior knowledge Occurs through multiple opportunities and diverse processes to connect to what is already known	Collaborative construction of socially defined knowledge and values Occurs through socially constructed opportunities
Teaching	Challenge, guide thinking toward more complete understanding	Co-construct knowledge with students
Role of Teacher	Facilitator, guide Listen for student’s current conceptions, idea , thinking	Facilitator, guide, Co-participant Co-construct different interpretation of knowledge; listen to socially constructed

		conceptions
Role of peers	Not necessary but can stimulate thinking, raise question	Ordinary part of process of knowledge construction
Role of student	Active construction (within mind) Active thinker, explainer, interpreter, questioner	Active co-construction with others and self Active thinker, explainer, interpreter, questioner Active social participator

Conceptual Framework

The researcher had carried qualitative study regarding the participation of the students in the mathematics learning. Among the variety of topics this research is conducting on the area under 'Learning and the Learners. This is concerned with the aspects of curriculum and classroom reform. Based on the above mentioned empirical as well as theoretical framework and literature the researcher designed the key consideration of the study presented below.

Consideration of the Key Components of the Study

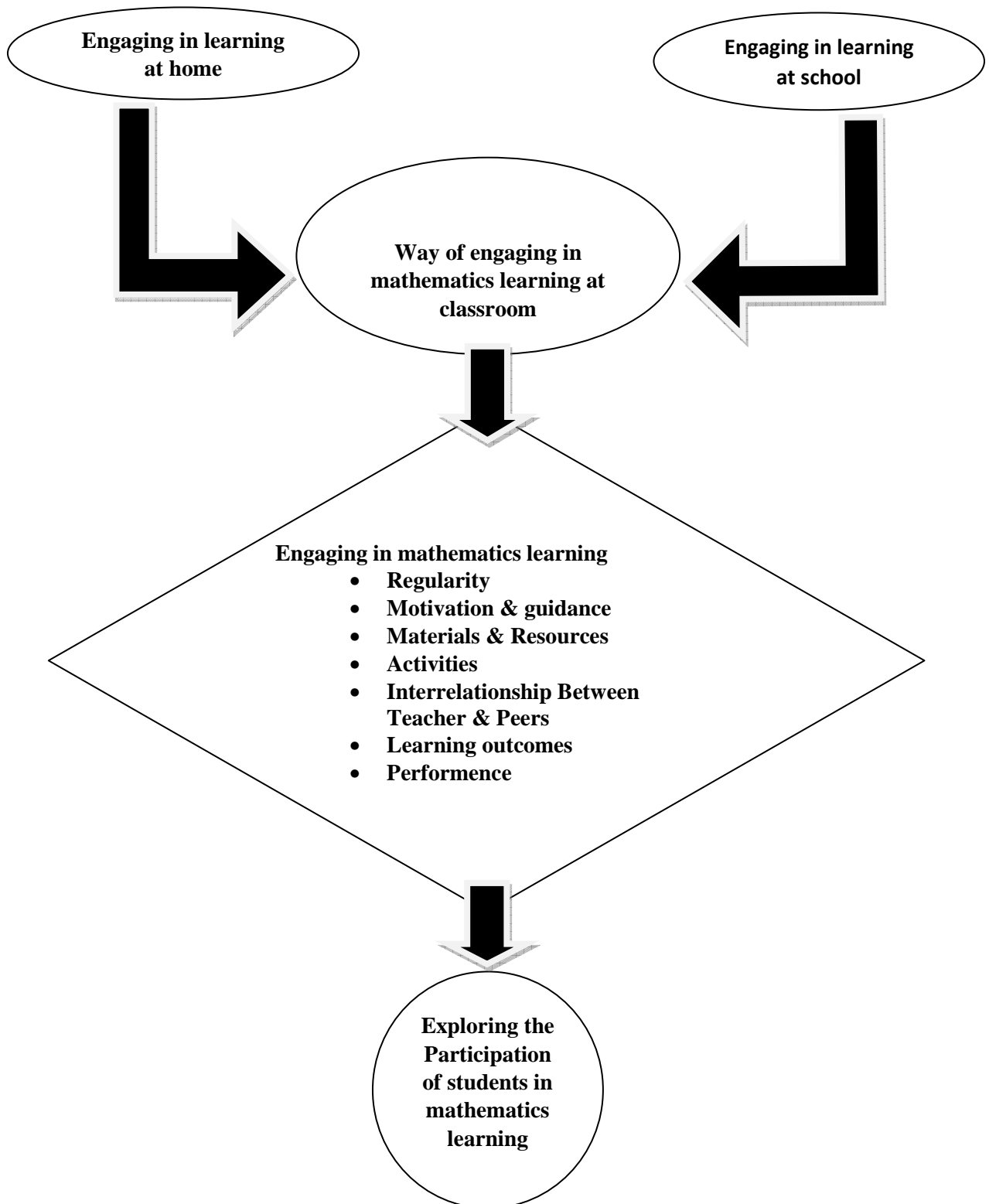
This study tried to explore the way of engagement of the student in mathematics learning. To find out the way of involvement of the student, their engaging pattern, Presentation or attitude towards mathematics learning in existing mathematics classroom in mainstream education in Nepal. To accomplish this study and to gain the result according as the objectives the researcher considered the key variables for the participation of the students in mathematics learning. The study resides within the two dimensions of the field. One was at the school and other at the home of the learner. With these two dimensions of the study the researcher compile them in classroom participation of the students. As a whole three aspects of the field had studied.

- Considerations for the involvement of students at home includes home environment and culture, motivation and encouragement towards mathematics learning, guidance in mathematics learning, homework, assignment and preparation for further study, application of the mathematical knowledge in other subject and their daily life and total time spent for mathematics learning at home.
- Considerations for the involvement of students at school includes application of the mathematical knowledge in the other subject, reflection of the students' mathematical knowledge in co curricular and extracurricular activities, total time spent in school for mathematics.
- Considerations for the engagement of students at mathematics classroom includes regularity of the students, the educational materials and resources bringing by the students in classroom and their proper usage, discipline, rules and regulations, efforts towards completing the learning tasks, collaboration with peers and teacher, following the teacher guidance, conditions of pre knowledge, submitting of previous assignments, homework and tasks, learning outcomes.

With the above consideration the study forwarded with the following Variables:

Regularity, Motivation and guidance, Materials and Resources, Activities, Performance of the students, Learning Outcomes in mathematics, Environment and Culture. The flowchart will be forwarded the process of study within the mentioned theoretical and conceptual framework.

Flowchart: 2.1: A Conceptual Framework for ‘Exploring the participation of students in mathematics learning’.



Chapter-III

METHODS AND PROCEDURES

This chapter delineates the design of the study and method used to collect information. The issues discussed to the statement of the problem demands in-depth study. Subjectivity of the subject matter should be essential for the better treatment of the problem. Thus within qualitative treatment that was studied because qualitative treatment is more open and responsive towards its subject matter.

A fundamental assumption of the qualitative research paradigm is a profound understanding of the world that can be guided through conversation and observation in natural settings rather than through experimental manipulation under artificial conditions. (Anderson et al. 2001, p.119)

Research Design of the Study

This was the interpretive study, the researcher followed qualitative research approach. To make a systemic study of the above mentioned problem and to attain the objectives of the present study certain procedure was followed. It was the study to examine students' regularity, motivation level, materials and resources used by the students, activities during or completing the learning tasks, interrelationship between teachers and peers, learning outcomes, performance, environment and culture etc. during mathematics learning in main stream education of Nepal. Which is presented as participation of the students and performance of the students in mathematics learning mentioned in the operational definitions above. This study mainly tried to find out the current practicing way of involvement of student in classroom or out of classroom for the

mathematics learning and what types of learning outcomes were detecting in their performance of the students during mathematics learning.

This study discussed to the statement of the problem demands case study approach within the qualitative treatment because this is non experimental, natural rather than artificial settings study. The researcher had selected the qualitative paradigm. Qualitative studies leave open the possibility to change, to ask different questions, and to go in the direction that the observation may lead the experimenter (Best and Kahn 1992, p. 90). To getting the answers of the research questions in this study needs open and responsive to its subject. Direct observation in naturalistic setting was the central part of the methodology.

Selection of the Site

In this study, the field was taken as the one government school from sub-urban area of Sankhuwasabha district. Which school represents the mainstream educational institution in Nepal. Nepal a developing country it has rapid growth of urbanization it was developing diversity in community. This is directly affecting the school community and the teaching learning activities of the school. The effect of those scenario were detecting in the learning outcomes of the students. Hence this field was selected for the realistic findings of the study.

Sample of the Study

The sample of the study were all the students studying in grade nine in the field school all total 48 students. Which were done according as the desire of the study.

Because the age group of the students in grade nine is 14 years from where their formal

operational stages of development begins and they were in their crucial periods in their study as well as in their developmental stage. From that periods they are starts to think their reality and identity and able to respond their own situations.

Tools and Techniques of Data collection

To carry out any of the research there is a need of the tools for the study for better collection of required information. This study was a case study where the tools for the qualitative research to get information from the respondents are applied for the finding of required information. In this studies the researcher adopted direct observation in natural settings with its qualitative form, in-depth interview and examination of the school records had applied as a tools.

Direct Observation

Direct observation is a close and full involvement of the researcher in a natural setting in order to experience and understand the behavior, interaction, event and so on. It helps to bridge and share the intimacy between the researcher and the setting which is under study, where the researcher's self-involvement in the teaching learning activities in naturally occurring settings which has advantages of putting researchers into first hand contact with reality.

In this study observation was done during the mathematics class as well as out of classes and for home environment with the both predetermined criteria as well as the need of the study with qualitative data. The respondents were not informed that they were being observed. To validate the information gathered from the observation the researcher conducted number of observation in the classroom, cross check for the previous findings

until the significant information were not identified, and tried to contrast with the mentioned theoretical framework.

To get required information the researcher observed students' overall activities individually and collectively at school, classroom, playing with peers, interacting with peers, co curricular and extracurricular activities interacting with teachers and in their community regarding on the observation area inside the classroom.

In-depth Interview

In depth interview had conducted with mathematics teacher, head teacher and parents in unstructured way regarding. The parameter for the interview was mentioned in appendix A, B and C.

According to sharma(2011) with the same respondents several interviews are taken in different times. In-depth interview attempts to draw very inner meaning of phenomena from the perspective of the respondents. It is taken periodically in different settings, and different circumstances of the respondents but the settings all the time is natural.

Examination of the school records

For the better recognition of the sample students, documentary materials recorded in the school which are specific to the subject matter had studied.

Data collection Procedure

The researcher was the part of the field that's why it was convenient for the observation. The researcher followed the parameter which was setting for the observation

to find out the answers of the research question. Parameter for the in-depth interview with concerned persons was followed and related documentary materials was studied within the parameter demanded by the variable of the study which were setting on the conceptual framework. The data collection procedure was conducted around of three months.

Data Analysis and Interpretation Procedure

As mentioned above, qualitative types of data were obtained. The researcher categorized the information obtained from the observation according as the mentioned variable and triangulated the information from the interviews with respondents. All the information gathered from the above tools had triangulated and analyzed with its subjectivity. The collected data were analyzed and interpreted with following the conceptual framework of the study developed by the researcher by using the interpretative method of data analysis. The study was not strictly obeying the particular theories in education but approaching with constructivist view of learning. The other theory and different views of learning within the parameter of mathematics education were considered.

Chapter-IV

ANALYSIS AND INTERPRETATION OF RESULT

This chapter deals with the analysis and interpretation of the collected information from the case study. During the study the researcher conduct different observation, interview and study of related document. Direct observation was done every day in classroom activities and School context about three months. The researcher tried comprehensive understanding of the complex instances about the field in its context with single case study design. The researcher tried comprehensive understanding about the way of engagement of the students at school and out of school in learning of mathematics. The in-depth interviews were taken with focused students, Mathematics teachers, Class teachers, Head teacher and Parents. The researcher observed the home and school environment and behavior of the key respondents. The case students' class attendance, teachers' regularity and others co curricular and extracurricular activities were noted by viewing the school document. Different reports and document which are essential for the study are analyzed. The information was collected from the grade eight and nine of the case school. The case school is located at the sub-urban area of the district headquarter Khandbari, Sankhuwasabha district. The collected information were analyzed and discussed under the following headings:

- Involvement of the students in learning mathematics at home
- Engaging in Learning mathematics at School
- Engagement of the Students at mathematics classroom
- Learning outcomes of the students in mathematics

- Performance of the students in mathematics learning

Involvement of the Students in Learning Mathematics at Home

Concerning on the way of involvement of the students in learning mathematics at home, according as the study most of the students were not found that they were taking seriously for their study at home.

Community is the first school of a child and the family members are the child's first teachers thus their participation in learning can improve student's learning. Learning of the children directly affects by the environment of the community. In various dimension development of the child and their learning are also guiding by the home environment.

The researcher observed that the most of the student's home environment were not conducive for learning. Normally students had not any study room for the learning. They were setting with their elders or they have to set their younger at home. During the study some students told that they had been frequently losing their textbooks, exercise book and other educational materials. They also said, "*We have no one to guide at home for mathematics. Individually we are not able to do the homework and study mathematics.*" They said, "*We were expecting tuition class or the extra class for mathematics.*"

Most of the illiterate parents were found not aware about the subject mathematics and their children's study. Most of the students who were with their parents were from economically marginalized family. The most influencing factor was that most of the parents were not aware of their children's learning and development. It was found that

some of the middle class families were also not guiding their children properly. In case of literate parents they said *“My children feel that mathematics is the hard subject but it was also beyond my capacity to help this level myself that’s why I told them for the tuition”*. They were not being able to manage the good learning environment for their children at home. In case of the students who were staying in rent most of the parents were far from them. These students were staying with some relatives and themselves together with siblings. They were not capable of managing their time for the study properly at home and their home environment was not sound for the learning.

Only the little number of parents and guardians were found guiding their children and making better environment for their children in mathematics learning at home.

There were different scenario are observed for the students who are in their adolescent years, number of students were in their late adolescence. They were seniors at school and entering the adult world of work but they were not being provided the favorable environment in their home and community. Sometimes that was seen hazards in their developmental tasks.

In regards to the way of engagement of the students in mathematics learning at home, the environment of the home play the vital role. The home environment is directly related with their culture, social class, economic status of the family, educational background etc. In case of making better environment for their children individual perspective, personality and the awareness of the parents plays the role because some parents were working class, farmer, labor etc. who were in lower economic class but their children were doing better in their study. That’s why economic condition and other factors like educational background are not only the affecting factors for the home

environment for learning. According as the head teacher, *the parents' concern towards their children's' learning was seen insufficient. Most of the parents leave the whole responsibility of their children's' learning to the school.*

According as the subject teacher, *most of the students were not doing homework and even they are not sincere about the learning of mathematics at home.* It shows that they were not engaging in learning at home. The researcher observed that around forty percent of the students were not studying mathematics at home due to the different causes mentioned above. Very least number of students was working hard at home and they were participating in classroom actively but most of the students were not doing so.

The above evidences and cases of the students show that the students were not motivating towards learning and they were not guiding properly at home. In the case of 'failure' students, students from illiterates family and some of the adult students this condition was even worst. It was found that there was seen most of the students were not involving in the learning tasks of mathematics at home. The students' participation at home for learning was not effective for mathematics.

Engaging in Learning mathematics at School

School Community

Shree Mangala Devi Secondary School is a government funded Public school. It is recognize as a lower secondary school by the government and permitted for the secondary level from 2069 BS. The secondary level is convincing by the effort of community which was not fully financial supported by the government. This was established in 2043 BS. It is located at the district headquarters of Sankhuwasabha. There is altogether 275

students are studying from grade one to ten including early childhood development centre. Most of the neighbor of this school is local community and currently there is also the number of migrated people from the remote areas of Sankhuwasabha, Bhojpur and Khotang district. Local communities are directly involving in the school management and development of the school. Some of the local people who are actively involving in the development of the school their children are rarely studying in this school. Most of the students are from the migrated community, temporarily migrated people and rest of them from local community. Most of the students are from Rai, Bhote, Magar, Tamang, Newar, Gurung etc. from Janajati, Dalit and least number of students from others ethnic group. The school community is diverse in nature. That was multicultural and multiethnic in social composition that is in terms of place, religion, cast, ethnicity, language, culture and different value system as well as multiclass in economic composition.

Most of the parents of the students are involved in agriculture, labor, foreign services and least number of parents are teacher, lower level civil servant etc. Most of the people in school community are lower middle classes they are also the parents of the students. Some of the middle classes people, politicians, civil servant, teachers, social workers, and businessman are also committed for the school.

Positions of the students in School Culture

The environment of the school was seen peaceful. The traditional common method of teaching and learning was conducting in the school. Most of the students were coming to the school till 10:00 am. The class started at the 10:15 am and the Tiffin time was at 1:15 pm. In the school, daily seven period was conducting each period of duration forty-five minutes. In Friday after the fifth period extracurricular activities was

organizing by the 'Bal club' and 'Junior Red cross Circle' according as the annual planning of the school. In the school there was also conducting the 'Scouting' programmed. The school management was doing their responsibility satisfactorily.

The school was a heterogeneous composition of the students in terms of gender, class, ethnicity, language, culture, minorities etc. Even in that diversity students were showing the only identification as a student in a school. The researcher observes that according as their individual differences of the students they were not exposing themselves in school. Somehow the school environment, available resources and the limitations of the school could not exposed the talents of the students in different dimensions. That's why students were not aware about their education and their all round development.

According as the school records the average attendance of the students were less than 80% . The causes of irregularity were the household work. It was observed that students were bunked the class before the leave. Majority of the students were staying in rent who are far from their parents so they were frequently went their home by leaving the school for the long time. Some of the adult students were also engaged in economic activities like farming, labor ect. In case of the lower level children their home environment affects them whose parents are not aware about their child education most of them were from the lower economic class and marginalized group.

According as the learning outcomes and Achievement there was not the homogeneity among students. Some of the students are positive towards the school and their education and some students are not seemed to be obedient in their education.

Physical facilities and Environment of the school

The school is located at the hilly area within seven 'ropanies' of land in two spots which are not compounding. School has altogether fifteen rooms at four building and blocks. There are eleven classroom including Early Childhood Development Centre, Two rooms are using as an office and two rooms for the library which is still not setting. Passages are using as a computer room and store. There are two toilets for the ladies and gents but not sufficient for that mass of the student, only one toilet for the staff both of ladies and gents. There is congested ground on two spots but there are difficult to play different kinds of game. The furniture is not enough for students and as well as teachers. There was no any facilities of Laboratories. The Library was not well managed for the students from the school side. There is a library kit for students and teacher which was donated by the 'Manaram foundation'. The convention of this kit is not effective due to the lack of human resource. There were not sufficient drinking water and sanitation facilities in school.

School periphery is more important for the good teaching and learning environment. Most of the hilly areas there are no good access of roads or path way to the school. The way to the school is seemed not bad for the children and the climate and environment of the school location is good.

The school has been conducting the secondary level in the effort of community without any post of secondary teachers provided by the government. The primary and the lower secondary teacher themselves were teaching in the secondary level also. Most of them are trained and have minimum qualifications for the secondary level. There are altogether 15 staffs among them ten government teaching staffs including a head teacher,

one Office Assistant, one Early Childhood Development worker, one helper, and two private teaching staff in the school. The major tools for school improvement are teachers' quality and adequacy. The present status of the school shows that there were still some inadequacies of experienced and qualified teachers for the particular subjects because the current scenario of the demography of teachers might not be in this condition by the cause of economic funding of the community, teachers transfer and the changes in the government policy.

The relation between Students, Teachers, Administration, School Management Committee, Teacher Parent Committee, Community and neighboring Schools are very well. Due to not being the full fledged secondary school there is lots of challenges to create the good teaching and learning environment. Stakeholders are passionately working towards the improvement of the physical facilities and the environment of the school.

Teaching Learning Environment at the School

The school create learning environment in which students are the focal point of the education system. Students explore curriculum content that had relevance to them and the reality of their communities. The rules and regulations of the school, the relationship between student and teacher, teachers and the administration, among peers and the overall physical conditions of the school are ultimately directing the teaching and the learning environment of the school.

In the case school, there is only limited number of the physical facilities and subject teachers. A subject teacher teaches around thirty periods per week. There is very

less time for the teachers to plan about the daily activities and interaction among fellow. Teachers had only time for attain the daily routine. There was the lack of collaboration between the teaching staff because of the time schedule. That's why teachers were involving in teaching learning activity individually but they are not loosing even a single minute of their classes. The staff mitting does the planning and make decision for the necessary actions and activities for the staffs at the end of the months. Mainly these staff meetings concerned about the administrative affairs rather than the teaching learning activities. The school had the annual plan for the whole academic year all the staffs were seen following this plan. The school administration encourages staffs to follow the rules and regulations of the school to make the sound teaching learning environment.

The settings of the classroom look like traditional pattern one column for girls and another column for the boys. In classroom there is only one white board in front of the class as a teaching material. The setting of the classroom was not flexible to reset according as the need of the classroom activities.

During the observation the researcher found that the teaching learning environment of the school is ordinary. Teacher students' ratio is accordance with the educational act. Management and administration level is ordinary and the entire subject teachers were punctual on their daily routine. Most of the teachers have their minimum qualification and trained for teacher. The environment of the school was seen peaceful but not sufficient physical facilities for the laboratory work, demonstration, multimedia etc.

Engagement of the Students at Mathematics Classroom

There was the normal size of classroom for the 49 students. Four students were sitting in a bench. Sometimes they had one bench for the five students. There were not sufficient spaces for the students to move around and for grouping during the class. During the observation students were seemed to passive in mathematics class. Among the students only few students were participating actively in the class work themselves and the remaining were staying for the teacher. Most of the students were very poor background in mathematics they are not aware even in a simple elementary mathematical operations. It looks like that they were not giving the proper attention during the mathematics class. The teaching learning activities were teacher centered. The teachers choose problems and solve this problem in board then students copy this. The researcher found that most of the students thought mathematics as a only problem solving task. It was found that students were not aware about the mathematical structures, applying the elementary mathematical operations during the problem solving and generating the steps in problem solving and gathering the related mathematical facts and information etc.

During the study researcher found that most of the students had interest in mathematics but they are not being able to expose their interest in their study by the cause of different anxieties in mathematics that's why students were escaping from the mathematics learning. Some of the students said "*mathematics is the compulsory in our curriculum that's why we are studying this subject otherwise we had already bunked this subject.*" But this voices were not from their innate instead of fear towards mathematics because the observer found in an opinionnaire cross check most of the students expressed they like mathematics and have interest in mathematics learning. During class

observation it was seen that the students had found lots of inadequacy towards learning mathematics like lack of pre knowledge for the further learning, poor background in mathematics, lack of educational material and remedial support to guiding in mathematics etc. which made students escaping from mathematics learning.

According as the subject teacher *most of the students have poor background in mathematics*. It was found that they were obtaining very low marks even less than 40% in mathematics in their terminal examination which is below the minimum national standards. It was found that very less number of the students are participating actively in the classroom activities. It was observed that, most of the students were present in the mathematics class without the necessary materials like geometry box, calculators and some students did not have separate exercise book for the mathematics. They were not using the textbook properly in the class during the class activities. They were involving in the classroom activities without proper learning materials and manipulative. According as the observation most of the students are using textbook but usage of reference books were negligible. Only half of the students have calculator and geometry box but they were not bringing these materials in the classroom. Remaining students had not these materials because they are not calling their parents for bringing this materials even their parents are capable of providing these materials. The usage of the proper teaching learning materials and manipulative were not accounted. The classroom conditions were not favorable for the using of manipulative materials. The class teachers rarely demonstrate the materials for teaching. That was the condition that teacher were not success towards arousing the interest of the students for the application of manipulative and materials.

There was seems to be very hard to motivate all of the students in classroom activities because they had not sufficient pre knowledge for the further learning of new topic. It was observed that the students had wrong beliefs that mathematics is a hard subject thus we could not learn mathematics very well. The students had lots of controversies regarding on the subject mathematics and they were not doing hard work in mathematics. They were neglecting and tried to escape from active participation in the mathematics class. It was seems that majority of the students were not benefitted from the regular classroom activities in mathematics learning. Most of them had learning outcomes below the minimum national standards in mathematics.

In the classroom the students were from the different cultural groups, ethnic group, economic conditions and from different societies. The age group of the students was not homogeneous. The ages of the students were from 14 years to 23 years. Most of the higher age group students were started their education lately and among them also the rate of repeating the class is very high. Most of them are from the remote areas, socially deprived society and marginalized in economic class. The interrelationship between peers is ordinary but in case of mathematics learning their condition is very poor. They have lots of controversies regarding on the subject mathematics. They are not doing proper exercise in mathematics learning. They were neglecting and trying to escape from the active involvement at the mathematics class.

According as the classroom observation It was seen that regular time period for the mathematics classes was not sufficient for that kinds of students. Most of the students said, *“we need some more extra time for mathematics class. Only from the regular classes we are not able to understand mathematics. Our expectation is that we need*

individual guidance then after we might improve our mathematics. We are not giving more time for mathematics because it is very hard to practice own self, we are not able to go ahead individually in learning mathematics.”

Learning outcomes of the students in mathematics

The school is a public secondary school. Only third batches of students are appeared in SLC examination. In case of nine only the terminal examination were accounted for the result. In case of DLE there is only one final examination are accounted for the result of the students when completing the basic level conducted by DEO.

Regarding on the case average learning outcomes of grade nine had 25% in mathematics. Which is below from the minimum national standard, in DLE minimum passmarks is 40%? The current learning outcome in mathematics was not meeting the minimum national standard. The records of the previous academic year were not more than that.

Regarding on the low level of achievement of the students, subject teacher said, *“Most of students in this school are from very weak background in mathematics. They are suffering from the belief that mathematics is a very hard subject so we cannot do well in mathematics. It is very necessary to change beliefs of the student but it is not possible only by the effort of mathematics teacher.”*

According as the school record, the age group of the students in grade nine were above than the proper age group like 14 years. There was domination of the higher age group students in the class. About the heterogeneous age group the head teacher said, *“Some of them had started school late from the proper age and most of them were*

repeating the same class.” According as the study most of the students were from migrated community some of them were permanently and some temporarily, they are staying in rent without their guardian and parent. Some were living with their siblings.

The head teacher said, *“The students who were living in rent were not proper guided by their family because their parent were not with them and some of the higher age group students have given less priority for their study but they have higher concerns towards employment, vocational work, household work etc. specially these higher age group students are repeating the class and changing the school”*. It was found that these higher age group students had attendance rate very low in the school. The main cause of being less attend in school were found that their household work, vocational need and they were more engaging in their cultural celebration and extraneous activities. This directly affects their achievement. More than 50% of the students were migrated from the other school, among them some were by completing their basic level to the secondary level and some are by the cause of failure in same grade.

According as the head teacher the learning outcomes of the students were not satisfactory because physical facilities like laboratory, library, classroom and enough space in school were not sufficient, the parents are less aware towards their children’s’ achievement, evaluation system was fully summative in nature, only terminal examination system is followed for the evaluation of the student.

From this study it was seen that the learning outcomes of the students were not satisfactory in mathematics, in this scenario the subject teacher have lots of challenges to motivate the students towards achieving the better learning outcomes in mathematics and the students were found afraid regarding on the achievement in mathematics.

Performance of the Students in Mathematics Learning

Learning outcomes refers as acquisition of knowledge, understanding, abilities, skills, attitude and appreciation after the completion of the learning tasks in specific subject matter. Learning outcomes deals what happens to an individual when he acquires a desirable attitude which was observed during the study regarding with the performance of the students. The performance of the students was categorized in terms of following aspects:

Physical aspect: The students had average attendance not more than 82%. In case of mathematics teachers that was 91%. The classroom setting was like traditional pattern girls and boys students were sitting each of two column. Neither all students were bringing their educational materials sufficiently nor the schools were able to provide sufficient teaching learning materials and resources. There were conducting mathematics classes only five periods per week as a minimum time period according with the curriculum of the main stream education of Nepal.

Psychological aspect: Psychologically most of the students were not feeling comfortable in mathematics. Most of the students were believed that mathematics is a very hard subject that's why we cannot do well in mathematics. They were not doing proper exercise for the learning of mathematics and they were paying less attention towards learning of mathematics. According as the other subject teacher It was observed that when mathematical content or subject matter had to study in other subjects' course like science, economics, social studies etc. students were feeling uncomfortable and try to escape from that subject matter. Some of the students were feel uncomfortable even with the mathematics teachers which might leads more vulnerable case towards the learning

outcomes in mathematics. The researcher found that most of the students were found not motivated towards the learning of mathematics.

Cultural aspect: During the study the researcher found that during observation the most of the students were not participating actively in mathematics learning at school as well as out of the school. There were not found better learning culture at the school and home for the mathematics learning. In the case of mathematics learning for the case students it was seen that they must have need of proper guidance and the roadmap for the better learning but there were not seen such better culture for the learning of mathematics. Which directly affects the learning outcomes of the learners.

In the classroom almost all students were following the teachers passively. The teaching learning activities were teacher centered. The students expect that teacher first do the problem in board then after they copy these problems. Sometimes teachers asked for the class work some of the students rarely accomplished simple tasks but most of the students were waiting for the teacher. Individual guidance also couldn't work. Most of the peer students were of the same learning background and they could not reach to the conclusion of the learning tasks then they show some hesitation and negligence towards learning mathematics. At last the classroom activities terminate towards teacher centered, teacher did the tasks on the board then students copied this.

Most of the classes had teacher dominated that's why sometimes students charged towards the teachers, sometimes they neglects the regular classes and thinking for the tuition. Most of the students were taken tuition for the sometimes but the learning outcomes of the students had not improving. It was found that most of the students were not doing their assignment and homework. Hardly some of the students were bringing

their homework and among them had copied with their peers. This shows that the learning culture was not favorable for the better learning outcomes of the students at home.

Chapter-V

SUMMARY, CONCLUSION AND RECOMMENDATIONS

This chapter is basically concentrated in deriving findings from the discussion of previous chapter. Besides finding and conclusion it has some recommendations which will be useful for further studies and educational implication.

Summary of Findings

The case study entitled “Exploring the Participation of the Students in Mathematics Learning” is an attempted to study about the how students are take parting in mathematics learning at sub urban areas. Actually how the learners are fascinating towards the learning of mathematics was the key concern of this study.

This case study conducted in a qualitative approach. Direct observation was the main tools for the collection of information. In-depth Interviews and study of the related documents were also the tools of data collection in one government funded public school of suburban area at Sankhuwasabha district. The respondents of the study were the students of grade eight and nine, their parents, mathematics teachers and the whole team of the school. The Constructivist Views of Learning was the approach used in the interpretation of the result.

The overall objectives of the study were to find out the way of engagement of the students and their performance in mathematics learning. The responding data were yield the results that dealt with regularity of the students in mathematics learning, motivation level of the students, materials and resources used by the students, interrelationship

between teacher and students, relation among peers and Performance as a major findings which as follows:

- Regularity of students in mathematics learning: only few numbers of the students were regularly studying mathematics at home and school, most of the students were not coming to the school regularly their conditions of learning at home were even worst.
- Motivation level of the students: As a whole motivation level of the student was found very low. The students were not found enthusiastic towards mathematics learning.
- Materials and resources used by the students: some of the students were using their Text book, Exercise book, Geometry box, Calculator etc. but most of the students were not using these materials properly.
- Interrelation between teachers and students: The relationship between students and teachers was found ordinary. Particularly some of the students were found isolated towards mathematics teacher.
- Relationship among peers: They had found unity among peers. They were not feeling uncomfortable for their diversity but not found collaborative in mathematics learning.
- Performance of the students: Most of them were not exposing their mathematical knowledge for their studies but it was found that they had tried to apply their mathematical knowledge in their daily activities.

Conclusion

The students are participating in mathematics learning on the basis of their curriculum with number of inadequacies like insufficient physical facilities, limited time period for the classroom activities, lack of resources etc. With their weak base on mathematics they were feeling ignorance in mathematics learning. They have only the teacher to guide in mathematics learning. Most of them have not provided guidance towards mathematics learning at out of school. The students are not actively participating in mathematics learning. They show some anxiety towards their learning outcomes regarding on mathematics. They always fear to fail in mathematics. Their cultural aspects towards mathematics were not favorable for the better performance. The home environment was not sufficient to support them properly in mathematics. That's why almost of them were not studying mathematics at home they have given less focuses in mathematics learning. Their participating style are not so enough for improvement of their mathematical knowledge.

Recommendation for further Study

The findings and conclusion drawn cannot be generalized in all schools but it could be helpful to improve the teaching learning quality as desired by the student. Which is applicable for the planning of student centered instructional strategies and which helps to the implementation of existing learning theory and methods of teaching and learning. There might arise some issues which needs to be further studies are as follows.

- This study followed the case of students' participation and the performance shown during study. It can be done with particularly in depth with comparison.
- It is the study done with macroscopically but It can be done with concentrating on any one of the particular factor regarding on this study.
- Only one school was taken for the case in this study more schools should be taken for the study with larger parameter.

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Appendix-A

Observation Area of the Students' Engagement inside the classroom

During the observation of the students inside the classroom following were the area of observation:

- Students Regularity
- Classroom size, seats, students sitting patterns
- Subject matter and the Specific objectives
- Teaching Learning Materials or resources used by students
- Excitement of the Students towards the new Learning
- Pre knowledge for the new topic
- Teaching learning activities
- Collaboration and discussion in subject matter
- Interaction between peers
- Interaction with teachers
- Uniformity in activities among students
- Involvements of student in determining right answers
- Learners self-regulations
- Submission of Assignments/Homework
- Evaluation
- Findings of the classroom activities
- Students' behavior and responses at the end of the class etc.

Appendix-B

Parameter for the Interview with Mathematics teachers

The interview with the Mathematics teacher was taken on the basis of following main topics.

- Time spent in specific leaning tasks by the students.
- The formal and informal rules how to take part in a given activity inside the classroom.
- Steps for an Activity or how activities are accomplished in classroom.
- Rules specify expected and forbidden actions in the classroom. They are the dos and don'ts of classroom life for secondary students:
 - ✓ Bringing all needed materials in class.
 - ✓ Seat and ready to work when the bell rings.
 - ✓ Respect and be politeness of the students to all people.
 - ✓ Respect other people's property.
 - ✓ Listen and stay seated while someone else is speaking.
 - ✓ Obeying all school rules.
 - ✓ Overall Participation of the students in terms of class attendance, classroom interaction with teacher and other students, attitude towards the subject matter and performance of the students in mathematics learning.

Appendix-C

Parameter for Interview with head teachers

The interview with head teacher was taken on the following roles of him to support mathematics learning.

- Existing condition of school: Physical facility, Mathematics Laboratory, Library, Number of mathematics teachers and Qualification, Number of students, Success/Failures of the school, Community participation.
- Physical facilities for the mathematics Learning.
- Professional development of math teacher.
- Learning environment in mathematics class.
- Relation with Mathematics teachers.
- Guidance for mathematics teachers.
- Students' opportunities for learning with teacher.
- Vision towards improvement of mathematics teaching/learning.
- Policy of school.

Appendix-D

Parameter for the Interview with Parents

The interview with the parents were taken in the basis of the following main points

- Children's Involvement in mathematics learning
- Expectation from school
- Relationship with Mathematics teacher and head teacher.
- Environment at home for mathematics learning.
- Childs' attitude towards mathematics at home.
- Learning mathematics at home.
- Views about mathematics.