

TEACHING/ LEARNING MATHEMATICS THROUGH COLLABORATIVE
APPROACH: AN AUTOETHNOGRAPHY INQUIRY

Subash Karki

A Dissertation

Submitted to

School of Education

in partial fulfillment of the requirements for the degree of
Master of Education in Mathematics

Kathmandu University

Dhulikhel, Nepal

April, 2014

Copyright by Subash Karki

2014

All right reserved.

DECLARATION

I hereby declare that this dissertation has not been submitted for the candidature for any other degree.

Subash Karki

Degree Candidate

December 6, 2013

DEDICATION

To my father Jaget Kumar Karki and mother Durga Kumari Karki

AN ABSTRACT OF THE DESSERTATION OF

Subash Karki for the Degree of *Master of Education in Mathematics* presented in
December, 2013 at School of Education, Kathmandu University

Title: *Teaching/Learning Mathematics Through Collaborative Approach: An
Autoethnographic Inquiry*

Abstract Approved

Mr. Toyanath Sharma

Dissertation Supervisor

Mr. Binod Prasad Pant

Dissertation Supervisor

This dissertation attempts to portray my lived experience of doing mathematics as a learner, as a novice teacher, as a novice teacher trainer. Teaching/learning mathematics through collaboration approach It focuses on the paradigm shift of mathematics teaching learning from the traditional (teacher centered) approach to collaborative approach from the lens of autoethnography. Autoethnography as the genre of doing research connects the person to the culture, placing the self within a social context (Reed-Danahav, 1997, as cited in Sharma, 2012). This qualitative dissertation uses autoethnography as a methodology. Autoethnography is a research writing a story where the researcher is the subject and the researcher's experiences are the data (Ellis and Bochner, 2000, as cited in Stinson, 2009). It focuses on pedagogical growth and changes that I have witnessed from my early years of profession as a primary teacher to my most recent arrival in this research work.

The purpose of this dissertation is to provide a personalized account of one mathematics learner to a novice teacher trainer's use of reflective teaching/learning as an agent of change. This dissertation is about a journey of change in instruction

fostered by a change of identity as a mathematics teacher to me and others towards transformative/constructivist approach of learning in terms of teacher-students relationship to maintain quality of education for future generation (Sharma, 2012).

In this research, I have used interpretivism, criticalism postmodernism as supportive referents and paradigms to embrace the multi- paradigm research design. Moreover, to give a shape to my study; I have used other different theories, such as critical theory, constructivism and transformative learning theory as my direction. Interpretive research paradigm helped me to be subjective to address the emergent issues of teaching mathematics, and other more critical paradigm helped me to identify my research problem to critically reflect upon my teaching-learning experiences and to transform my teaching/learning from traditional approach to collaborative approach.

In the process I have represented my stories has shown in the form of transformation during based on my research project. I have investigated that traditional teachers centered teaching learning strategy unhelpful dualisms to make our mathematics more meaningful. But as I have experienced of collaboration approach I can depict out this collaboration approach is more momentous than traditional approach teacher centered approach in teaching learning of mathematics. So my image to develop collaboration approach in teaching learning of mathematics between students and teachers focused in Nepalese context, this strategy has enhanced me with vision in developing new direction of teaching strategy for employing collaborative approach in mathematics.

December 6, 2013

Subash Karki Degree Candidate

Master of Education in Mathematics dissertation of Subash Karki presented on

December 6, 2013.

APPROVED

_____ December 6, 2013

Toya Nath Sharma

Dissertation Supervisor

_____ December 6, 2013

Binod Prasad Pant

Dissertation Supervisor

_____ December 6, 2013

Amrit Bahadur Poudel

External Examiner

_____ December 6, 2013

Asso. Prof. Bal Chandra Luitel, PhD

Research Committee Member

_____ December 6, 2013

Prof. Tanka Nath Sharma, PhD

Dean, School of Education

I understand that my dissertation will become part of the permanent collection of the library of Kathmandu University. My signature below authorizes release of my Dissertation to any reader upon request for scholarly purposes.

_____ December 6, 2013

Degree Candidate, Subash Karki

ACKNOWLEDGEMENT

I would like to thank God for the power to complete this dissertation. There were many such occasions/times when I thought I would just give up, but God opened the doors for me that no man could have ever opened. I will walk in a humble manner upon receiving my degree, knowing that it was God who enabled me to reach this landmark in my life. I would like to express my gratitude and heartfelt thanks to my supervisors, Binod Prasad Pant and Toyanath Sharma for encouraging me to carry out the study by providing guidance, constructivist suggestions, instructions and cooperation throughout this study. I am indebted to them for the necessary materials that they made available to complete this research. I am grateful to Assoc. Prof. Bal Chandra Luitel, PhD for his valuable suggestions, supervision, guidelines, positive encouragement in multiple ways. I am equally indebted to Toyanath Sharma, and Binod Prasad Pant my dissertation supervisor for their friendly behaviors, inspiration, positive motivation, constructive suggestion during this research. I would not have been able to present this dissertation in this form without their guidance and guideline.

I would like to express my deep gratitude to Prof. Tanka Nath Sharma, PhD, Dean of School of Education, and Prof. Mahesh Nath Parajuli, PhD, HOD of Educational Leadership and Development Studies, School of Education, Kathmandu University for their facilitation and support in my project.

I would also like to express my sincere gratitude to my Assistance professor Tikaram Pokhrel and Assistance professor Sahadeb Uperti for their guidance, constructive and valuable suggestion.

I would also like to express my sincere thanks to Amrit Badhaur Thapa, Amrit Poudel, Pundary Phuyal, Dil Bahadur Gurung, Sheshakanta Pangen, Nilam Shrestha,

for their facilitation and inspiration throughout my new dimension of learning journey to School of Education, Kathmandu University.

My sincere thanks goes to Hari Pd. Dhakal for correcting language errors and also to my inspiring co-learners (2011 Feb. Batch M.Ed. students), namely Niroj Dahal, B.R. Maharjan, Bimlesh Mishra, Dil Kumar Maharjan, Dilipkumar Acharya, Hari Bista, Ketana Thapa, Pratima Sapkota, Ramita Lama, Santosh Poudel, Satya Raj Joshi, Surendra Mishra, SurendraSingh Thagunna, and Keshav Pokhrel who always motivated me to go ahead. I express my sincere thanks to all of them for their valuable suggestions, ideas, good advice, and inspiration and support in my endeavor to carry out this project.

I express my sincere gratitude to the Principal Amrit Kumar Khadka of Bhimeshwor Academy School, and my colleagues Gita Dahal, Dipa K.C., Ganesh Shrestha, and Sharmila Poudel for encouraging and managing time for me to finish this project.

I am indebted to Mr. Raju Maharjan and Mr. Dil Bahadur Shrestha, administrative staffs of Kathmandu University, for their supports in my research work, and librarians for providing me required books and research materials available at KU library.

I am highly obliged to all the members of research committee for their inspiration, guidance, suggestions and constructive comments.

TABLE OF CONTENTS

AN ABSTRACT	i
-------------------	---

ACKNOWLEDGEMENTS	iii
TABLE OF CONTANTS	v
ACRONYMS	x
CHAPTER I	1
JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: EMERGING WITH RESEARCH AGENDA	1
Chapter Overview	1
Introduction	1
Background of study	2
Beginning phase of my formal education	9
First occurrence in collaborative classroom.....	11
Problem statement.....	12
Purpose of study.....	13
Research questions.....	13
Significance of the study	14
Chapter Summary	14
CHAPTER II.....	15
RESEARCH METHODOLOGY	15
Chapter Overview	15
Voyage to research method/methodology.....	15
Multi paradigm in my research.....	16
Interpretive paradigm	17

Critical paradigm.....	18
Postmodern Paradigm.....	19
Getting perplexity for selecting my research methodology	20
My Research method and methodology is an autoethnography.....	21
Data collection.....	21
Data Sources and Analysis	22
Philosophical consideration.....	22
Epistemology.....	23
Ontology.....	23
Quality standards	24
Trustworthiness.....	24
Verisimilitude	25
Critical reflexivity.....	26
Emergence	27
Pedagogical Thoughtfulness.....	27
Theoretical referents	27
Constructivism	28
Collaborative learning	29
Cooperative learning	31
Transformative Learning Theory	32
Hebermasian Theory.....	32

Paulo Freire's Theory	33
Ethical consideration	34
Chapter summery	35
CHAPTER III.....	36
JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: TRADITIONAL TEACHING LEARNING PEDAGOGY IN MATHEMATIC CLASSROOM	36
Chapter overview	36
My painful mathematics learning day	37
Learning difficult in geometry.....	41
Beginning as a novice teacher	49
Chapter Summary	54
CHAPTER- IV	56
JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: TOWARDS COLLABORATIVE TEACHING LEARNING PEDAGOGY	56
Chapter Overview	56
Moving to New Direction.....	56
Begins phase of college life in teaching mathematics.	58
Moving to New path	64
Journey through new paradigm.....	65
Transforming in collaborative approach	74
Chapter Summary	80

JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: COLLABORATIVE TEACHING PEDAGOGY IN MATHEMATIC CLASSROOM.....	81
Chapter overview	81
Turning point of my teaching method.....	81
Learning intricacy in decimal number	89
Teaching Geometry with prophecy.....	95
Chapter Summary	100
JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: STIRRING FOR/WITH TEACHER EDUCATOR	101
Chapter Overview	101
Way forward to teacher educator.....	102
Beginning Phase of novice trainer	107
Using collaborative approach as Teacher educator	112
Chapter Summary	124
CHAPTER VII.....	125
JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: MY LEARNING AND REFLECTION DURING RESEARCH WRITING PROCESS ..	125
Chapter Overview	125
Visualization of training program being as a teacher educator	125
Final Reflection.....	130
Letter for All Mathematics Teachers	131

My Future research direction and possibility132

REFERENCES136

ACRONYMS

APA

American Psychological Association

B.Ed	Bachelor of Education
B.Sc	Bachelor of Science
HOD	Head of Department
I.Ed	Intermediate of education
ICT	Information and commutation Technology
KU	Kathmandu University
LHS	Left had side
M.Ed	Master of Education
MPhil	Master of Philosophy
PhD	Doctor of Philosophy
RHS	Right hand Side
SLC	School Leaving Certificate
TU	Tribhuvan University
UNESCO	United Nation Educational, Science and Cultural Organization
VDC	Village Development Committee

CHAPTER I

JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: EMERGING WITH RESEARCH AGENDA

Chapter Overview

In this chapter, I have located my research topic and the reasons for why I have chosen the collaborative teaching/learning approach as my research topic. In the distant past, I practiced a traditional teaching method in mathematics education which I have incorporated in this chapter as the background of the research and how I took on a journey towards transformative research. Moreover, in this research I have articulated problem statement, purpose of the study, my principle and subsidiary research questions based on the transformative research design. Additionally, I have discussed the study and the chapter summary in this chapter.

Introduction

Before I selected a research topic in mathematics education, there were diverse issues in my mind. It was really problematic for me in the beginning, but later my research classes at Sagarmatha University helped me how to select of a research topic as well as what to write on the topic. My facilitator started to teach research methodology to all mathematics students including English and educational management group when some research ideas triggered in my mind. He taught us how to visualize research topics. Gradually, I got customized with the research methodology and its implication in pure mathematics.

In the context of Nepal, we faced several problems in mathematics education both as the teachers and the students. Upon my teaching experience and experience of students' life, I decided to undertake a research on mathematics teaching learning

through collaborative approach. Students considered mathematics a difficult subject and showed little interest in mathematics. So, I decided to carry out a research by collaborative approach in mathematics to make mathematics teaching/learning meaningful for students and teachers of Nepal. When I selected this collaborative approach, the learning of mathematics in group/collaborative work was really beneficial to me as well as to other teachers who more meaningfully used more this collaborative approach in teaching/learning mathematics.

We simply understand the collaborative learning as group task learning. Collaborative learning is defined in various ways, but it seems to me that this collaborative is constructivist model learning (Belbase, 2006). So in this, learning is active but not passive like in a traditional approach. Moreover, this collaborative approach as cited in Belbase (2006), Jonassen (1994) asserts that learning environment support "Collaborative construction of knowledge through social negotiation, not competition among learner for recognition".

Background of study

I started my formal educational in a rural area of Nepal where I was born. My formal education began from primary level in my village school, which was located very far from my house. My school days began when I was six years old. Before joining the school I didn't have any basic concept of mathematics. At that time there was not a pre-primary school concept. So, I got admitted in grade one.

It was in grade one when I took my first Mathematics class. My mathematics teacher taught us counting numbers from one to hundred and directly wrote them on the blackboard without any discussion with students. It means my mathematics teacher didn't apply any others approaches to teach us counting number. He didn't

even try to motivate us towards learning mathematics .Up to grade five, the same teacher continued to teach us mathematics.

As I was upgraded, I felt the mathematics subject more difficult. I couldn't internalize any new mathematical concepts in this stage of my student life. In grade two, we were taught the multiplication table. During that time my mathematics teacher gave me to memorize the multiplication table up to twelve. He threatened me, *"If you failed to tell the multiplication table up to twelve without looking at the book, I would send back you to grade one."* At that time, I got very troubled and disturbed by his remarks. I read the multiplication table several times and memorized it finally. Next day, I told the table from one to twelve without referring to the book. My mathematics teacher became happy and encouraged me to do better in the following classes.

After completing the grade two from that school, my perceptive of mathematics was changing. Before admitting in grade three, I didn't think more about mathematics knowledge .While I was in grade three, I felt difficult to solve subtractions and additions with borrowings in mathematics. My teacher used to teach us by the problem solving and lecturing method.

For me, Mathematics was a harder subject than other subjects. Later, I knew Mathematics had three branches are: algebra, geometry, and arithmetic .Up to grade five, I did not find Mathematics interesting, but sometimes several types of questions came to my mind such as, why we apply this (+) symbol for addition , why we use only such symbols to add mathematics problems? Why not others? These types of questions used to arise in my mind. Thus, I was conscious about some mathematical symbols and their uses. In primary level, we had to study chapters about money, measurement, time, etc. But I didn't understand those topics. Sometimes, I would ask

questions myself, “Why do I have to read numerical only in mathematics?” “Why are we not given stories and language to read? He was always forcing me to do only numerical parts, solitary in mathematics. Up to primary level, my learning journey was ignored by the (Lerman, 2009) perspective. Basically, my education was followed by the absolutist perspective during the primary level. So, at this stage I understood mathematics subject is not similar to language and totally I find out it de-contextualized (Luitel, 2003).

After completing the primary level, I joined another school in the lower secondary level to continue my formal education. That school was very far from my village. Every day, I had to walk for an hour to reach my school. Whenever I attempted to solve mathematical problems in the mathematics class, I felt more difficult than I did in the primary level. But if the teacher taught, I would feel easier; otherwise more difficult at that time. Later as I grow up obligatory, it looked more dualism (Shrestha, 2011). Whilst I was in grade six and seven, I did not understand mathematics. But, I would be excited to solve mathematical problems when teachers taught us in class. I could solve without any shrewd genre. My Teacher taught by the some logical orders to solve mathematics but I thought why we needed the logical order to solve mathematical problem and why we couldn't do directly. Such type questions struck my mind .While I was in grade six or seven, I did not have other reference books except for the government prescribed book. The demand of mathematics teacher, at that time was very high. We didn't get chance to have trained teachers of mathematics. And teachers would teach us the own way they like. They didn't encourage us to learn mathematics. But every time, they threatened us to physically punish instead. I tried to learn different formula and other exercises solutions rote. I have compared mathematics with other subjects to see if they are

different. Luitel (2003) asserts that mathematics subject is taken as a foreign subject. Arriving at this stage my view seems similar to (Luitel, 2003). I also thought at that time mathematics and English subjects were international subjects or as foreign subjects. And different questions arose in mind about mathematics.

In grade eight, I faced more problems with mathematics than before. There was no mathematics teacher for grade eight. My school was very far from the district headquarters of *Dolakha*¹. So in the secondary level, there was the scarcity of math teachers. Due to the scarcity of mathematics teachers in my school, my school head teacher searched for a mathematics teacher in Kathmandu ; and he found one mathematics teacher who came to teach in our school .But he disappeared after a month because my school was located in a rural place. And I didn't get a qualified teacher of mathematics while I was in the secondary level. Whoever came to teach us mathematics, I found them very rigid; and they used only one way of teaching- the lecturing as well as problem solving method. In the context of Nepal, mathematics teachers were traditional. Most of the teachers didn't know about other teaching methods in mathematics, but just traditional approach.²

I used to get afraid of my mathematics teacher. Even if I had problems in mathematics, I did not dare to communicate with my mathematics teacher because my mathematics teacher was very rigid and cruel. He always tried to use the teacher centered approach of teaching such as problem solving and one way lecture methods. Those were popular in the context of Nepal in teaching mathematics.

Moreover, the school management also imposed strict rules; only those students who performed very well in the exams could choose optional mathematics. Other students didn't get chance to chose the optional mathematics subject. Since I

¹ One of the district of Nepal

² SLC- School leaving certificate

didn't have good marks in mathematics in class eight results, my school did not allow me to take optional mathematics in grade nine. There was a provision of choosing an optional subject in grade nine. But I was interested to study optional Mathematics. In grade nine, I tried to take up optional mathematics, but my head teacher and mathematics teacher discouraged me to take up optional mathematics. I was persistent. Later, they accepted my request and allowed me to study optional mathematics, but on condition that I had to work harder than before.

There again, I found mathematics to be more difficult than other subjects. During secondary level mathematics I felt one collection of formula and foreign subject (Luitel, 2009). Whilst in secondary level; I was supposed to memorize the formula of optional mathematics and compulsory mathematics. And teachers were not cooperative with students; they just followed their traditional approach in teaching mathematics in class.

After completion of my School education, I had a kind of enormous dream to study at a university. However, I didn't know what to pursue in the intermediate level. On long contemplation, I planned to join intermediate level with mathematics major. My ultimate goal was to be a pure mathematician.

I could not differentiate between pure mathematics and pedagogical mathematics at that time. I had the misconception that those who had learned mathematics would be all mathematicians; and my interest also increased in the same mould. I took up major mathematics even in the bachelor level. Meanwhile, I got an opportunity to teach mathematics in a school as a primary level mathematics teacher. I had a wonderful experience of teaching mathematics from different perspectives. I was still confused about pure mathematics and pedagogical. By the

time I finished Bachelor level, I had gained a little knowledge about the types of mathematics.

After completing Bachelor degree, I joined Master's degree in mathematics at Sagarmatha University. Only in the master degree, I got the knowledge about im/pure mathematics. Luitel (2003) argues that the nature of mathematics as not pure not impure. I also agree with his view about the nature of mathematics. I believe that pure/impure mathematics depends on our use. We had a debate about the nature of mathematics at Sagarmatha University ³ in the class of mathematics education. I didn't know pure /impure (Luitel, 2003) mathematics and different perception of mathematics just I came to know mathematics was pure. But now coming to this juncture, I could say I learnt to know how to look into mathematics from different perspectives. I was benefited from class discussions and the facilitator who taught us about the nature of mathematics. I can say about my learning journey.

Before I joined intermediate level, I would take up mathematics from the absolutist view and after intermediate level I followed the Mathematics as both not imp/pure (Luitel, 2003) view. At Sagarmatha University, I got very collaborative environment; and the teaching style was also constructive. Moreover, I found all facilitators very focusing; they relied on students centered learning approach. They tried to be good facilitators in our study. I am particularly impressed and inspired by their approaches in teaching mathematics. I am confident that I can apply those teaching approaches, which I learnt at Sagarmatha University, in my mathematics classes in a school.

³ Sagarmatha University – Change name of any University in Nepal

Generally we understand about culture in its widest form which includes art ,history ,languages ,literature ,medicine ,music ,philosophy ,religion ,science ,technology .Although we talk about mathematics curriculum in the context of Nepal ,a large amount of the students and teachers are felling for mathematics a foreign subject (Luitel, 2003). I have spent my days both as a teacher and a student .I also felt the mathematics subject poles apart from our culture. But I have got more comprehension about culture concerned with mathematics by joining Sagarmatha University through mathematics education class with ethno mathematics.

I realized that mathematics could be taught in multiple ways and we could have linked mathematics curriculum to our society and culture. If we were able to associate our mathematics curriculum with our culture, it would be more beneficial to students. Moreover, numerous local practices can be found in Nepali communities to link mathematics curriculum such as practices in farming, local business, household activities, children's age games, culture practices, art facts and social events (Shrestha, 2011). As mentioned noticeably in the context of Nepal by (Luitel, 2003) the teachers point out towards mathematics curriculum which is centrally controlled and imported from foreign ground that does not meet the need of Nepali society and culture. Mc Conatha & Schnell (1995) say that culture is an organized system of Values which are transmitted to its members both formally and informally. Thus, the government also should implement mathematics curriculum emerged out from Nepali culture and society. Especially, this is also my research schema in mathematics education, which is necessary in the context of Nepal.

We can use different approaches in teaching mathematics if we dare to embrace those new teaching approaches at schools in today's society. For a student "to be competitive in a global market, we can no longer rely simply on traditional

educational strategies "(Tobin, 1993, p. 109). To fulfill these desires, we could replace the traditional methods of teaching mathematics with innovative teaching strategies, which include collaborative, discovery and inquiry learning, project based learning and problem solving methods; whenever we facilitate this type of opportunity to students, teachers and students should interact with each other. Students should be provided ample of opportunity to participate in the teaching learning process of mathematics. Teachers have to create such an environment where students become more enthusiastic to interact or collaborate with the teachers. Especially, this research was conducted, seeking the essentials of collaborative teaching approach in mathematics classes.

In this 21st century, collaborative approach in mathematics as well as in other subjects is very essential as it helps to promote easy learning environment for learner and facilitator. "Group learning is more authentic because it more closely approximates work place activities and adult learning "(Tobin, 1993, p. 108). Piaget also advocates s that learning is the active participation of learner not the passive receiving facts (as cited in Bhandari, 2010, p. 7). While we use collaborative approach in classroom, this collaborative learning is found in constructivist theory. Knowledge is constructed by learners (Poudel, 2006, p. 5). Within collaborative approach, (Nepal, 2007) Nepal has concluded that this approach avoids the gender bias and fosters the learning in their own participation.

Beginning of my formal education

I was born in Dolakha, a remote district of Nepal. This is where I began my formal education in a school there. When I started my formal education from grade one; I was introduced to mathematics. I was taught the number system in '*Devagnari*' number system. My mathematics teacher did not try to give practical knowledge of

mathematics about counting numbers. He wrote numbers on blackboard and asked us to rote the written numbers by heart. I did not get good understanding in mathematics. I just memorized the numbers which was given to me or written on the blackboard without any number conception. My formal education was completely oriented to rote learning system especially in mathematics. Moreover, my mathematics teacher never brought innovative approaches of teaching mathematics into the class. In the student's life, from school level to college level, I couldn't get this collaborative approach. All mathematics teachers were interested in just problem solving and traditional lecturing method. As a result, students felt difficult in studying mathematics.

In the context of Nepal, mathematics teaching learning activities are based on one way lecturing of teachers without providing opportunities to the students. This doesn't seem fruitful in teaching learning of Mathematics. Students do not know where to use their knowledge of mathematics learnt in the school. When I joined Sagarmatha University for my master's degree in mathematics education, I learnt several pedagogical approaches in teaching mathematics which I had not got in my student life as well as in teaching career. There was no single method of teaching mathematics. Some schemas, which can be included in teaching mathematics, are: collaborative approach, cooperative approach, discovery based approach, and problem solving approach. Among these approaches, collaborative method is most useful in teaching learning mathematics where students engage in groups to solve their problems; and they create new knowledge by the collaborative approach. Collaborative approach can provide possession to the students in learning mathematics.

First occurrence in collaborative classroom

It could be any day of August in 2011. I woke up at 5:00 in the morning and finished all my daily work within an hour. But after breakfast, I reflected on my teaching profession and suddenly realized that I taught in a completely different way from primary level to secondary level. To my surprise, I happened to think about collaborative classroom. I didn't know about the collaborative classroom in teaching mathematics before. So I didn't try to apply in my teaching learning activities in mathematics. When I took collaborative class in my university level of M.Ed.⁴ program with specialization mathematics education, I was very animated to teach mathematics by collaborative approach⁵ in mathematics class. I made a plan to apply collaborative approaches in mathematics. I decided go to school earlier that day.

My school was very far from my residence. So I started early that day and got to school at 9:30 p.m. That day I was very much excited I was going to apply collaborative approach in my mathematics classroom .As usual, I went to grade eight to teach mathematics with daily use materials in the classroom. I used to teach by traditional approach, but on August 21, I used the collaborative approach to teach mathematics in the class. I found some students to be very curious to learn mathematics where as some students felt uncomfortable with the collaborative environment. But all students participated in the given task and shared their knowledge with each other.

Such classes inspired me to study something new about the topic from the eye of a teacher, which may be different from other teachers who teach in normal setting of classroom. I have selected this topic to make a research in mathematics education because I saw a problem with mathematics teaching and the relationship between

⁴ M.Ed – Master in Education.

students and teachers. So we have to convince the teacher in such a way that they will use collaborative teaching approach in mathematics teaching as in Sagarmatha University.

Problem statement

Being a student and teacher of mathematics, I focused more on the traditional approach in teaching learning mathematics. This traditional approach in teaching learning mathematics creates a big problem in mathematics class .I was also badly affected by this traditional approach in my life.

I realized the importance of collaborative learning in teaching/learning mathematics. This collaborative approach helped me to avoid the negative concept in teaching mathematics. Finally, I knew that collaborative approach of teaching mathematics is one of the most useful tools to promote learning environment in mathematics class. This method is not only useful for mathematics teaching but also promoting learning environment in language subjects.

In this method, learners cooperate with a group or engage people; it is very important for getting achievement in various fields. Until/unless we are able to co-operate with people in a society, we will be unable to adjust in the society. So everywhere it is necessary to co-operate with his/her co-workers. I used the qualitative research method. This qualitative research is beneficial for teachers in teaching learning mathematics. Other researchers might have done their research on this same research topic, but their research methodology tends to be positivist paradigm. But my research methodology is different from others. I have used qualitative research approach with autoethnography in my research. So I wanted to bring about research on practices of collaborative teaching learning in mathematics in secondary level.

Purpose of study

The main purpose of the study was to find out the active involvement of the students in learning mathematics and to give them opportunity in the learning of mathematics. This study aims at exploring my practices of the collaborative approach in teaching mathematics which not only improve my practices but also provide an account of how a teacher can perform knowledge appropriately among students' groups.

Research questions

It was not trouble-free for me to write research questions. In the beginning I got a problem to write research questions. During the class, my facilitator told me that we could conduct the research program in multiple ways by making different questions. There were different paradigms to conduct research. According to different research genres, we would be able to create research questions in different ways. There is not a single way to make research questions. During the formation period of my research questions, I went through the examples of collaborative research questions in the teaching learning mathematics. And I developed the research questions after the review of some literature and some others research reports. But the nature of my research was different and I was aware of the type of questions appropriate for auto-ethnography. This type of research writing situates the researcher in the research context. I made the following research questions in the process of inquiry.

The principal research question is: How can collaborative approaches promote meaningful learning in mathematics?

The subsidiary research questions, based on the principle question are:

1. How did I practice my mathematics teaching/learning in the classroom?
2. How does collaborative teaching affect/contribute to learning mathematics?
3. How do I transform my teaching learning activities into collaborative approach?

I made the research questions on the basis of my research topic and I tried to situate appropriate research question in research chapters. So if readers want to get answers of the research questions, they can go through my dissertation.

Significance of the study

This research may be proved a corner stone in the process of teaching learning of mathematics in the context of Nepal as well as others countries. Especially, this research study will be used to change self and others. This research method and methodology will promote to change researchers' self. As explained in Ellis (2004), this auto-ethnographic approach gave me the opportunity to speak from inside out. In collaborative teaching environment, teachers will find it beneficial in teaching learning mathematics by the help of collaboration approach in teaching /learning mathematics provide very interactive environment between students and teacher and students are free to share their problem in a group .Moreover teachers roles are also facilitators or mediators they don't show one sided lecture method in teaching learning so this approach is not sole use in Mathematic. We can use it in the several areas in the field of education. It would be more beneficial for students, teachers, parents and education institutions.

Chapter Summary

In this chapter I presented my research agenda by selecting the research area. Moreover through this chapter I illuminated why my research agenda was necessary as collaborative approach in teaching mathematics. Thus, I was aware of teacher center scheme in teaching mathematics, which I experienced from my school level to bachelor degree. I was not used to teacher center method in teaching mathematics before that. Thus, in this chapter I highlighted the importance of this research project in master's degree.

CHAPTER II

RESEARCH METHODOLOGY

Chapter Overview

This chapter presents my research methodology for my research project. Especially, this chapter gives a complete picture of my entire research. Moreover, it includes my research methodology, research method, ontology, epistemology, ethical issue, quality standards, and different theoretical references with data sources in this chapter.

Furthermore, it signifies how the researcher came to conduct the research project.

Through this chapter I visualized the whole body of my research. Thus, this chapter discussed how the researcher (I) conducted the research.

Voyage to research method/methodology

When I started to write this chapter, I got a lot of problems and was very confused because I was not quite sure about my research paradigm. I tried to write my research methodology chapter in several paradigms without obeying any rules of research paradigm but it was useless. I got knowledge of different research paradigms from positivistic to pluralism (Luitel, 2012). Before I took the research methodology class at Sagarmatha University, I had thought of conducting my research project in quantitative approach because I was a mathematics education student at Sagarmatha University. In the meantime, I had a kind of negative perception about research methodology for why mathematics students required for they conduct qualitative research. Therefore, I was unable to go with qualitative research method.

In M.Ed. program, I was not aware of qualitative research paradigm because I was the mathematics education student and I always inclined towards quantitative rather than qualitative paradigm. But I took several classes on research methodology

in education and my facilitator also encouraged me to adopt qualitative research paradigm. So, at last I was also interested in the qualitative research paradigm. According to the research topic we can select different research paradigms and use an appropriate way to conduct our research project; there was no single way whatever we are interested in. Research methodology is the process of conducting research; without methodology we can't conduct our research. So it is a very useful instrument to conduct our research. The methodology helps us to plan, conduct, and summarize of our research effectively. As Cohen and Manion (2000) says "by method we mean the range of approaches used in educational research to gather data which are used as a basis for inferences, interpretation, explanation, and predication" (p. 44).

Before I went on with my research methodology part here I tried to represent different paradigms of research method in education to conduct our research. Every research work is more valuable in education research. There is no compulsion for using a particular research paradigm in education research. Thus, for convenience, we can use any of them precisely. But each and every paradigm is useful in education research.

Multi paradigm in my research

I have used multi paradigm in my research a metaphorical journey of the critical researcher my methodological interest within not sole paradigm. When I have conducted my research, methodological interest are interpretative, critical, postmodern research paradigm. When staying myself within multi- paradigmatic research design space, I used auto-ethnography as a fusion research method/methodology in my inquiry.

Interpretive paradigm

The main objective of interpretive research is to generate reflective self or understanding of the others in context or culture. Interpretive /constructive approaches to research have the intention of understanding "the world of human experiences"(Cohen & Manion, 1994, p. 36), suggesting that "reality is socially constructed" (Mertens, 2005, p. 12).In interpretive paradigm we can research by the ethnography, self-study as well as interviewing, these are main key of interpretive research method. The interpretive researchers tend to rely upon the "participation ' views of the situations beings studied " (Creswell, 2003, p. 8) and recognize the impact on the research of their own background and experiences.

The main quality standards of interpretive research are trustworthiness and authenticity. Without trustworthiness and authenticity, there will be no quality standards of interpretative research paradigm. So, to make research work trustworthy and authentic, researchers should have deep immersion in the research program. For ethical consideration, researchers should respect at first self and then others for fair representation.

Interpretivist, as Taylor, Settelmaier, and Luitel (2012) claim, "is concerned primarily with generating context-based understanding of people's thoughts, beliefs, values, and associated social actions". As an interpretive researcher, I attempted to seek for clarification, understanding, and extrapolation to similar situations of the status of reflective writings in my research. In this paradigm I have focused on meaning making process of an individual as "I" "a researcher", a "teacher", and in the mean time " a social and culture being " (Luitel, 2009). Furthermore when I have to use this paradigm in my research, I have to write a story, a poem, etc. and interpret them with different views of multiple nature of subjectivity.

Qualitative, interpretative, research helped the researcher organize and describe subjective data in a systematic way (Glesne & Peshkin, 1992); whereas, the quantitative, positivist, mode guided the researcher on a quest for certainty and absolute truth and an insistence of objectivity (Patton, 1990).

Critical paradigm

Critical theory research tends to emphasize relationship that involves inequities and power, and a desirable aspect of critical research involves helping those without power to acquire it (Wills, 2007, p. 81). The main of the critical research paradigm is to foster democracy by transforming unjust social structures, policies, belief, values and practices. In this critical paradigm, whatever we have practiced, and negative belief of traditional approach in teaching learning of mathematics to all mathematics teachers being as a (me) critical researcher. I have tried to change their negative belief and practices of traditional approach in teaching mathematics. Moreover the help of this critical researcher (me) as a critical change agent for society so may I can deliver the collaborative approach in teaching mathematics as far from the traditional approach. Others more about the critical paradigm promotes the notion of social justice in order to create the world which is "fairer, more equitable, more inclusive and more harmonious "(Taylor, 2008). In this research paradigm the main role of critical researcher (me) is to be a change agent of society and in my education field where I'm being engaged in education field. Thus, I attempt to conduct my research method based on collaborative approach of teaching/ learning in mathematics so that it can help to change self. The help of this critical paradigm in my research works to help teacher educators and teachers and teachers to reconstruct their teaching/ learning so as to empower all students (Pandey, 2010).



Postmodern Paradigm

The main aim of postmodern paradigm is to disrupt the presumed primacy of any paradigm (especially positivism) by embracing differences pluralism and playfulness in modes of thinking and representation. In postmodern paradigm I have used in my research by the several approaches such as writing as inquiry, writing as reading, multiple logic, and multiple genres. This paradigm in my research helped me in offering my traditional practices with my belief about collaborative approach in teaching mathematics as new approach to improve my pedagogical practices and remove the traditional practices of others teachers in teaching mathematics. It is a part of the larger postmodern movement that includes art, music literature and cultural criticism. Postmodern paradigm valorizes different perspectives, and we couldn't get same arguement .But Rosenau (1992) argued "Almost all post modernists reject truth as even a goal or ideal because it is the very epitome of the modernity ... truth makes references to orders, rules, and values; depends on logic, rationality and reason, all of which the post modernist question ". Especially my research has tended to more criticalsim. In this paradigm believing me that the postmodernism promotes epistemic pluralism (Gautam, 2011). In this paradigm (Luitel, 2009) asserts that I used the propositional – analytical logic without giving due emphasis on alternative –inclusive logic such as non/dual, dialectical, poetic, narrative and metaphorical, logics, which potentially account for a complex nature of knowing being and valuing.

This section represented different paradigms in education research above. There is no single way when we conduct an education research. According to the research interest, researchers may conduct a research project by using either qualitative or quantitative approach.

Having perplexity in selecting my research methodology

It can be any day of August. On that day, why I felt to be different from other days? For that I was in front of my desktop to write third chapter of research methodology on my research topic. This type of question and feeling came into my mind. Also I asked question myself but why I didn't get answers. I had always the same routine in my daily life but that day I wanted to be a little busier in life than on other days. That day, I woke up rather early in the morning .After doing my daily activities; I pressed the start button on the laptop. At first I looked at my proposal.

In my research proposal, I had included participatory action research in research methodology but I planned to change my research methodology because I thought about my research proposal once again. But I was not aware of using this same research methodology and I had used it for the first time. In the earlier stage of my research endeavor, I determined to do action research and my research instructor also said to me "*your research seemed to be participatory action research*". I prepared my research proposal in the same vein. But later I decided to employ the research methodology which I had conceived before.

So I changed my research proposal and I used the same research methodology which I had applied first. My proposal's methodology was auto ethnography because if I used this approach in my research without any complication I could bring collaborative approach in mathematics teaching through my past experiences of student's life. So I was confident as it was an appropriate research methodology for my research. Once I was confirmed about my research methodology, I made a plan to initiate my research too. Suddenly I forced myself throughout this day to begin my research.

My Research method and methodology: auto-ethnography

I have selected my research method and methodology as an auto-ethnography research in my research. In this study, I tried to adopt an auto ethnography qualitative research to represent the affect of collaborative in learning mathematics. Auto-ethnography has the combination of three words – auto, ethno, and graphy which indicate the textual representations of one's personal experiences in his / her culture context (Luitel, 2009, p. 35). I entered the qualitative research with auto-ethnography. Auto- ethnography is a useful methodology to conduct my research and through this methodology, I would know how to easily bring my lived experiences as a novice teacher, researcher, trainer and students.

When I conducted the auto- ethnographic research, my own lived experiences are in the centre. My voice, feeling, beliefs, emotions, values and reflection on my crucial in meaning making (Sharma, 2012). Moreover research work also was more constructive as well as more relevant in the context of Nepal and for other country also. Richardson says ' auto-ethnographies are highly personalized revealing texts in which authors tell stories about their own lived experiences, relating the personal to the culture ' (Richardson, 2000). My approach as auto- ethnography in this design focused on investigating my lived experiences of teaching and learning both of child and adult (Afonso & Taylor, 2009 as cited in Dahal 2013).

Data collection and Data Analysis

I easily can bring my past lived experiences and use of reflective writing use of collaborative approach in teaching/learning in mathematics. I used the data collection process, where I used research focus on studying self. Others more I have used the data collection ,videos ,personal , photo, journal and others different written

materials, which are then analyzed by a coding procedure to illuminate patterns or concepts that are building blocks of theory" (Best Kahn, 2003, p. 257).

(Best & Kahn, 2003) has advocated using the data collection procedures, including observation, interview and focus group discussion as the critical procedure for collecting qualitative data.

Data Sources and Analysis

This research is an auto-ethnographic research work. So primary sources of data is researcher self. From the field study also I collected collaborative teachings approaches and participant's views. My data sources are story writing, narrative writing, diary, reflection of other different participants' views. Moreover, my data sources stem from some semi-fictional writings, different art-based writing and pictures. I considered the reflection and analysis of story as the main sources of my data collection—the use of collaborative approach practices in the classroom. Observations of the classroom of students, teachers, and their daily activities were reflected through the interpretation, and daily diary was considered as the main sources of my research data. Furthermore, in data analysis process in my research project from several data I have tried to represent in narrative form which seems to be a reflective practice of teaching learning activities. Where I have incorporated my reflective experiences from traditional to collaborative approach in teaching learning mathematics those all story has represented pedagogical practices in my career. When I have to use the narrative writing as my data text, I have to interpret each data text on the basis of several supportive theoretical references and literature.

Philosophical consideration

Every research should carry the philosophical ground because it provides us with the fundamental beliefs and our research always guided by the philosophical illustration.

Philosophical consideration gives researchers a standpoint to design of the research methodology. Theoretical consideration idea and belief to researchers determine his/her standpoint in the research area. It is very essential or key things to appropriately design our research methodology. The selection of research methodology process is affected by our philosophical consideration. Therefore, I would like to elaborate the philosophical consideration in terms of ontology, epistemology, and axiology which are given as below:

Epistemology

Epistemology is concerned with the nature of knowledge and how it can be acquired: by collaborative approach in mathematics. Cohan and Manion (2002) said that "Epistemological forms concern the very bases of knowledge –its nature and forms how it can be acquired and how human beings communicate to others "(p. 6). In my case, the epistemology assumptions provide me the way of knowledge generation about the use of collaborative approach in mathematics. I know by the reflective writing, my experiences, observing the class, considering teachers view on the collaborative approach in mathematics and comparing and contrasting the learning through collaborative by past and current.

Ontology

Ontology is concerned with the theory of reality. In my research, what I will do would be reality of my research. So without reality, my research would not be appropriate. It tells us how one perceives the knowledge by the subjective or an objective way. Moreover, ontological assumption is concerned with the very nature or essences of the social phenomena being investigated (Cohen, Manion, & Morrison (2002). From ontological perspective, both the subjectivist and objectivist have taken for finding the appropriate strategies of using collaborative approach in teaching

mathematics. My research is based on the subjectivism and constructivism which advocate there is no single reality. So at this stage I do not believe in a single reality or truth in the world. Constructivism always believes that knowledge is constructed by human beings as they engage with the world they are interpreting in their own way.

Quality standards

This research study was my voyage of transformation from the technical interest to that of practical and emancipatory interest. In my research I have advocated Habermasian theory when conducting my research. Moreover, I have tried to be such a researcher who seeks for transformation. Therefore, the technical interest was grounded on the paradigm of positivism and quality standards also based on this positivism. I used the quality standards of positivism but it could not judge my research inquiry for the positivistic quality standards of validity, objectivity and reliability. They were almost not appropriate to judge quality standards of my research project (Luitel, 2009 as cited Shrestha, 2011). When I conducted my research with auto-ethnography inquiry, the quality standards I have used are verisimilitude, Credibility and trustworthiness, pedagogical thoughtfulness, emergence and critical reflexivity for my research. The standards for this auto ethnography are art based rather than positivist based. By using auto ethnography for my research, I have included narrative writing in order to represent my (self) and other culture.

Trustworthiness

Every research study needs credibility and trustworthiness to preserve the research. So without credibility and trustworthiness our research doesn't seem authentic and valid. It means researchers must provide verification to his/her research work. Regarding this, Cohen, Manion and Marison (2000) state that "in qualitative research

the researchers are the key instrument rather than researchers' tools". It means while researcher conducted any research within their interest area there should have to be a solemn within research area .Credibility is enhanced by deep description (Geertz, 1973) through the construction of the participant experiences and meaning, and stories of participants taking into account in interview and observation. Others moreover Creswell (2007, p. 207) has advocated eight strategies for credibility and trustworthiness of qualitative research as stretched engagement and persistent observation; triangulation; peer briefing or review ; negative case analysis; clearing researchers biasness through reflection ;member checking rich and thick description and external adults .

These are the key things to design qualitative research. So, while researchers fascinate towards qualitative research paradigm, they include above given key points. To build the credibility with the participants, I afforded to give the participants the transcribed by the narrative stories of participants constructed from the observation. Others I also quoted their verbal responses directly. To clarify or maintain, the research credibility and trustworthiness, Creswell has recommended that researcher may engage in at least two of the strategies. Although, especially I have used prosperous portrayal; stretched engagement and persistent observation and clearing researcher biasness through reflection as strategies to argue credibility and trustworthiness of my study area.

Verisimilitude

I have used my research methodology as an auto-ethnography inquiry. So, in my research I have used my own experiences as primary data that



challenged me for the degree of connectedness which I made the readers remind with. Self study, according to (Bullough and Pinnegar, 2001) should ring true and enable connections. Therefore, I need to show more artistic and realistic my lived experiences. Moreover as cited in Sharma (2010) and Marcus (1994) asserts verisimilitude as a set of laws set by conversation and as a mask that presents these laws as text's submission to the rule of a particular genre. It describes a text's reality and it asks some question about representation in text consistent with real and about the truthfulness of text. He further advocated, "verisimilitude can be described as the mask a text assumes as it convinces the reader it has conformed to the laws of its genre in so doing it has reproduced reality in accordance with those rules "(P. 580).

Critical reflexivity

In this research, I have presented how I have learned mathematics in my school and college level. Moreover, I have reflected my lived experiences about teaching and learning mathematics also I explored how I taught mathematics in classroom. This study included self reflected truth of mine with vulnerability of the researcher by exposing



me. By using the critical reflexivity, it represented the quality of my knowledge construction process. I hope to have explored my personal 'political' agenda and disclosure of the past to some extent. Therefore the idea of critical reflexivity entails the notion of exposing me as well as being self- conscious of my own (unfolding) subjectivity (Luitel, 2009 as cited in Sharma 2012).

Emergence

In this quality standard, I have tried to show my lived experiences and reality whatever I did in my life. My lived experiences and reality is always in the process of change, adaption and emergence (appearance of constructs, ideas, activities, phenomena, in the teaching learning process (Luitel, 2009). After some of my lived experience and reflection, one part of my memory experience keep rising including emergence and fluctuations under this section (Gautam, 2011). When I have to use auto-ethnography research the quality standard of emergence has been very essential for judging the merit of research in terms of possible progression in my ideas and perspective during the time of research (Sharma, 2012).

Pedagogical Thoughtfulness

I tried to invite readers to engage and hopefully find some narrative which leave impact on their pedagogies. Van Manen (Luitel 2009, as cited Pandey 2010) writes that present and future readers of my texts are evoked to question reflect and their own pedagogical practices.

Theoretical referents

When we have to use some theories in our research, it would provide strong relation in our research project. In this study, I have included some relevant theories which have supported me to develop my research project. To develop my research project I have incorporated these theories in my research which are transformative learning theory, Paulo Friere theory, constructivist, collaborative and constructivism theory and Habermasian theory. This research of theory is mainly concerned with the role of collaborative learning in teaching mathematics. In this study, the researcher's key

research question is "How collaborative teaching can help develop the mathematical knowledge and skills of students and how do they influence pedagogical practices?"

Constructivism

Constructivism is a kind of paradigm or world view posits that learning is an active, construct process .In constructivism the learner is an information constructor.

Through constructivism learners actively construct or create their own meaning subjective representation of objective reality. New information is linked to prior knowledge, thus mental representation or subjective. The constructivist classrooms appeared to provide the current learner with opportunities to build on prior knowledge and understanding to construct new knowledge and understanding from experience. While students are allowed to participate to collaborative environment and they find meaning in them because of their real –life context. furthermore in constructivism students are encourage to explore possibilities, invent alternative solutions, collaborate with others students ,try out ideas and hypothesis ,revise their thinking and at last they promote the best solution .

Constructivism is a theory of learning based on the idea that knowledge is constructed by the knower based on mental activity. When learners want to construct new meaning there learners should to be an active organism to seek new meaning. To learn new knowledge, learners also should feel that I also important role in learning situation .So always learners should have to feel, it is not forced by the persons and learners individually feel him/her to change. Then only learners easily construct the new knowledge.

Collaborative learning

When I went through Taylor (1997) I found that there are several approaches in the collaborative learning and all of them that apply students lived experiences from which they continuous to learn. In this stage I have tried to select the actual real life situation of student's problem and they don't present through the traditional approach but it in the artificial context in the classroom to be solved by the class. And my role is always being the artificial context of the classroom also provides the authentic key experiences.

Collaborative learning is mostly defined as "A situation in which two or more people learn or attempt to learn something and more specially as joint problem solving (Dillenbourg, 1996, p. 1). In collaborative learning there every problem try attempt within group, if people try to solve of problem within group then problem will be trouble-free to solve. So According to Dillenbourg state to learn something we need to more especially as joint problem. Others more Roschelle and Teasley advocated collaborative more especially as "mutual engagement of participation in a coordinated effort to solve a problem together,"(as cited in Dillenbourg et al., 1996, p. 2).

In collaborative approach we work together to accomplish shared goals. Others more Johnson & Johnson (1998) also advocate that collaborative learning is a student centered rather than teachers centered that active learning is more effective than passive one where we found teachers become just instructors only not facilitators . While we focused collaborative approach in learning, students have to change ideas, make plan and purpose solutions to achieve a collaborative goal. Therefore it is helpful of students ' social and personal development.

In the collaborative teaching learning beneficial is teachers give more priority to be active for the student teachers less talk within subject matter, increased students talk, students found more passion related with problem, a greater amount of comprehensible input, a more relaxed classroom atmosphere and greater motivation for learning. Other more focus on collaborative learning, Johnson, Johnson and Holibec (1988) advocated that collaborative learning provides main key for the teaching students to process skills that are needed to work successfully within a group.

In many research works, we have found collaborative research and cooperative learning in Piaget and Vygotsky (Dillenbourg et al., 1996). For example social constructivists emphasize that knowledge is constructed through social interaction. So when we need to construct knowledge that comes constructed through only society. Socio-constructivists borrow Piaget's system of development stage describing children cognitive process. According to the socio-constructivist approach, cognitive inconsistency is critical in triggering growth .Social interaction helps to facilitate the students to interact with peers at more advance development levels. Vygotsky work placed more emphasis on the value of social interaction itself for causing individual cognitive change, as opposed to being merely stimulated by it (as reviewed in Dillenbourg et al., 1996). Moreover in collaborative approach , according to Vygotsky the zone of proximal development did work the distance between what students can accomplish individually and others students can more capable with the help of others.

Collaborative Heyman (2008) says that social experiences can shape children's reasoning about credibility of claims. Others more Nelson (1994) provides the few clues as to how collaborative can prompt cognitive development among students.

Also collaborative provides a means of transportation for students to attain necessary environment and assist to make implicit disciplinary expectations more unambiguous for students.

In traditional classroom, my own perception at that time was that group work was not used in teaching mathematics as well as other subjects. If we provide equal opportunity to an individual or a group, everybody can participate actively and they can create new knowledge within a group. Kagan and Kagan (1994) state that to learn new thing, everybody should be guaranteed to have an equal opportunity to participate. Without participate in a group knowledge couldn't be constructed easily.

Coulthard (1977) says that especially "teachers have two main roles in teaching: the first role is to facilitate the interaction process in the classroom and the second role is to be active as an autonomous participant within the learning teaching group". From his perspective we comprehend that it would be more beneficial for the teachers to facilitate the learners in the classroom. The students should be provided with chance to learn in a group in an independent environment rather than in a rigid way guided the learners by teachers.

Cooperative learning

Cooperative learning is one of the most remarkable areas of theory, research, and a practice in education .It occurs when students work together to accomplish shared learning goals (Jonshan & Jonshan, 1999). It is one of the most promising practices in the field of education. While we use this approach in teaching mathematics, it would be more beneficial in the field of education as well as teaching mathematics.

Transformative Learning Theory

In my research this transformative learning helps to conduct a literature review for my research. When I attempted to conduct my research in collaborative approach, I was not able to get chance to use this collaborative approach in my teaching/learning .So before I had used the collaborative approach in teaching learning. I was highly customized to traditional approach in teaching learning .But after my master degree I used this collaborative approach though .I have presented in this study how my teaching learning moved to transformation rather than to traditional approach. In collaborative approach learners are free from compulsion and have equal opportunity to presume various roles in learning phase. Thus, in my research students have got chance to participate in learning mathematics. Transformative learning (Mezirow, 1991, 1995, 1996; Carton, 1994, 1996) is the process of effective change in a frame of reference. Moreover, transformative learning Mezirow (1997) asserts that a transformative learning environment as one in which those participating have full information, are free from coercion, have equal opportunity to assume various roles, can become critically reflective of assumptions, and are willing to search for common ground or synthesis of different point of view.

Habermasian Theory

In my research, Habermas theory has been very essential.

This theory has helped to me develop each and every chapter.

As of three human interests technical, practical and

emancipatory of Habermas theory has supported in my study. In this study; at first I totally advocated in traditional approach in teaching learning mathematics before I took admission my master degree. But after I studied about it in master degree, gradually I was advocating a collaborative approach in teaching learning activities.

Interest in general is the pleasure that we connect with the existence of an object or an action (Habermas, 1972, p.198)

In this study, this theory gave me more authentic ideas useful for my research. In addition to it, every chapter would embrace Habermas theory. In the beginning phase of my teaching learning as a novice teacher and learner, I had little knowledge about collaborative teaching learning method. But later this theory heightened my understanding about teaching learning process. So at this stage technical interest has helped to give me more authentic knowledge for delivering my data and theme. Furthermore, my research has shown that I, as a teacher and learner, was gradually transforming myself traditional approach from collaborative approach of teaching/learning. Therefore, in this study Habermas theory has helped me to present more reliable information for my research data and theme.

Paulo Freire's Theory

"Our task is not to teach students to think – they can already think ; but to exchange our ways of thinking with each other and look together for better ways approaching the decodification of an object" (Freire, 1982). My previous teaching/ learning process was not in line with collaborative approach. I was highly advocating bank deposit education system knowledge is a gift bestowed by those who consider themselves knowledgeable upon those whom they consider to know nothing .It means in my school level, whatever my teachers learned and was taught in their previous school. In the same way, they taught us. So I was also influenced by the same approach of banking⁶ deposit pedagogy when I was teaching students. I was also not away from this Freire theory.

Before I got admitted in my master degree, I used to follow the same traditional approach to teach my students mathematics which I learned in my school

⁶ Knowledge has provided same as like container box

and college .Moreover, in Freire’s view people produce knowledge to humanize themselves.

Ethical consideration

To conduct any kind of research, researchers' ethics is necessary. Therefore, the important aspect of my research is the self respect and respect to others .While I conducted this auto-ethnography research in my research area; I had to be careful and responsible for the ethical issues within research area. In this ethical consideration Creswell (2007) sates that "qualitative researcher has to face many critical issues that surface during data collection in the field ,analysis of data and dissemination of qualitative reports "(p. 141). When we did self - studies in education, we may divulge the problem and issues that make someone an educator (Bullough & Pinnegar, 2001). In doing my research project sensitive issue may be revealed and confronted until I take full responsible for whatever I have written.

During my research time, I paid full concentration to retain self respect and right of research informants. In my research, the first ethical issue is taking consent my research informants. I have gained experiences of learning mathematics not only as a mathematics student but also as a mathematics teacher and educator. So, at first I took consent from the inside of my heart. Additionally, during my research endeavor, I made the participants conscious of the information that I wanted from them so that participants feel free to give their own view without any hesitation and they can be more interactive with each other in a group. During my research, I assured them that it would not create any psychological stress, personal effect, embarrassment and humiliation to the participants.

Chapter summery

Overall, this chapter focused on qualitative research. I conducted my research in line with an auto-ethnography method. So my research method and methodology is an auto-ethnography.

I mentioned research methodology, philosophical consideration and the methods of data collection and analysis. Finally, in this chapter I have included quality standard and ethical issue of this research study. Furthermore, in this chapter I have incorporated theoretical lens which are essential for me to develop the research. The theory presented above would be more supportive where my different lived experiences of student life as well teacher life. Additionally, on the basis of my research area I have tried to connect several theories such as transformation learning theory, Paulo Firere theory, and Habermasian theory which were more appropriate for my research.

CHAPTER III

JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING LEARNING PEDAGOGY IN MATHEMATIC CLASSROOM

Chapter overview

In this chapter, I have incorporated different episodes that represent my past lived experiences as a teacher and student of mathematics. Moreover, this chapter has narrated the story as to how I started my teaching learning career in mathematics as a teacher as well as student and how I used traditional teaching learning approach. Specifically, this chapter represents my reflection on the traditional approach in teaching and learning mathematics. In this chapter, I have developed my first subsidiary research question. Both as a student and teacher I experienced that most of the mathematics teachers exhibited more egocentric behaviors in their class. I also used the same teaching approach; collaborative approach was beyond my imagination. Moreover we can find in this chapter how I dealt with mathematics as a student and teacher. Furthermore, I tried to present all episodes as to how I taught my students algebra, geometry and arithmetic. This chapter, based on these episodes, has attempted to address my first subsidiary research question. Therefore, in this chapter I was totally guided by Habermas theory of technical interest. I used Friere theory because I was oppressed by traditional approach in teaching and learning mathematics.

My mathematics learning process: a painful journey

Some twelve years ago, I was twelve years old. At that time, I was studying in a lower secondary level⁷ school, which was very far from my house. Therefore each and every day I spent more than one hour to get to the school.

One day it was raining heavily; I had to go to school. That day I made a plan to go to school earlier than other days. Thus I came out of the house and headed to school. I arrived at school on time without any difficulty. Since it was a new school, I felt new environment different from the primary level⁸ school where I studied up to grade five. Due to the change in environment, I felt difficult to adopt myself to that situation. I was struggling hard to adjust myself to the school environment.

It could be any day of July, Prakash⁹ (changed name) sir was teaching mathematics. I knew that he was a very strict teacher who always gave heavy punishment if we didn't do the mathematics homework and class work. So the entire class including myself was afraid of the mathematics teacher because of his rigid behavior in teaching mathematics class. The first period was Nepali period. Mathematics was taught in the second period. When second period bell went for the mathematics period, I would never be happy. It might be due to his treatment towards his students. Out of fear, I always thought this way "*why he is coming fast in the mathematics class and I accepted always to come late*". But he was not late in the school for that period; he entered the class with a stick in his hand. Soon we leapt into feet and said "*good morning sir*". He in turn said very rudely, "*Sit down; sit down!*"

⁷ Lower secondary level- It represents class6- 8 in Nepal

⁸ Primary level – It represents class 1- 5 in Nepal

⁹ Name of the student

Whenever I saw him with a stick in his hand, my heart started beating very fast because of fear. That day he wanted to teach us algebra--factorization and simplification related to $(a+b)^2$ and $(a-b)^2$ which he wrote on blackboard to teach us the lesson. And he said in the class *“Today, I'm going to teach you a new topic which is very important from the examination point of view. So you all keep quite. Otherwise you will be punished. So see this stick!”* When he warned us this way in the class, the whole class would remain silent. Writing the formulae, $a^2+2ab+ b^2$ and $a^2- 2ab+ b^2$ ¹⁰ on the black board, he said more about that day's lesson there- *“ It is very important in algebra. So you should memorize these formulae to solve algebraic problems. He said, “ you have to memorize them”. “Otherwise you will be badly punished”.* When he wrote the formula of algebra¹¹ on the board, we just sat quietly in the class because he was a very rigid teacher compared to other teachers in my school. We didn't get a chance to ask any question related with the topic in mathematics in his period. But that day, the first boy of our class, he (Ram)¹² asked him a question on the topic, *“Sir, don't we have any other process to find out this formula and why are you writing a formula only?”* Whilst he asked him that question, we all looked at him. We felt a little bit uncomfortable because no one dared to ask him questions in his class. We never asked any question which we felt difficult in mathematics class and my mathematics teacher also never provided that opportunity for the students in the class. After my friend asked a question, mathematics teacher became so angry in the class and he said, *“All of you keep quite; don't be over smart in the class and don't ask this type of silly question in my class. You aren't a mathematics teacher; I'm teaching you mathematics not you. ”* Oh! He was so furious that his face was becoming so red.

¹⁰ Algebraic formula.

¹¹ Algebra – Mathematics sub branch.

¹² Name of the person.

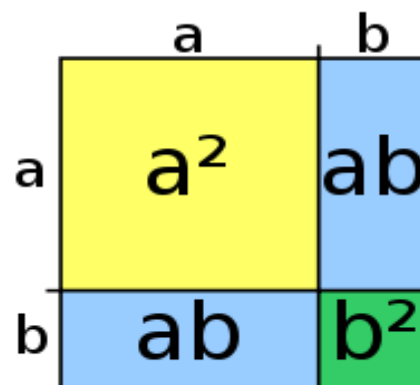
"Everybody, you need to follow what I'm teaching in the class. What I teach is all correct. Just follow me what way do in the class. We don't have any alternative way to teach mathematics. Everybody, you should memorize the formulae of mathematics. Then only we can learn, or else not".

After that incident, we were not motivated to learn mathematics in his class and we didn't try to ask any other questions even if we had confusion and doubt about mathematics problems. In no time, the class turned into normalcy. He started his class again. We were just passive listeners. Throughout the class, our teacher looked angry. At the end of the class he said *"I'm not only the teacher who is teaching mathematics the way I am doing now. Many other mathematics teachers follow this method. You can't find other new approaches of teaching mathematics .whenever I was a school student, my mathematics teacher too taught me in the same approach not different from mine .Thus I don't have other approach to teach this formula. So everybody, you have to learn in this way".*

After that, I have had the impression *"mathematics is very difficult to all."* I was unable to remove it from my mind. Therefore I tend to see mathematics as, to quote Hart et al. (1981), a "very difficult" subject that some people seem to be able to do and others not despite many years of learning mathematics. Actually, negative perspective about mathematics developed in me. All over Nepal, most of the mathematics teachers used the traditional method in teaching mathematics. The bell rang; he gave us homework from that chapter and he said *"everybody, you should solve all these problems and submit to me tomorrow. Those who fail to do so will get*

punishment. So everyone should be careful". We showed our consent and said, "Yes sir, we will complete the entire homework tomorrow".

From the above story, we can say that algebra teaching and learning became more difficult and confusing for students. Often, teachers teach without any visualization. Simply, they wrote the formula on the board and solve the given problem directly and assigned homework to the students. Today, students have to face the same serious problem in learning algebra. Teacher centered approach or one way lecture method was very popular in the past and still in practice nowadays. They don't try to use new method of teaching, such as collaborative method in teaching /learning mathematic. Always they focused on rote and memorization. This is how teachers developed a kind of bad trend-- whatever way they learned from their teachers, by the same way they taught their students. With my story above, I have attempted to set my journey of learning and teaching mathematics to present my extensive experiences (Sharma, 2012) as situated in teacher- centered classroom¹³. Where ever I started my formal education, the teachers just focused on teachers centered approach. I learnt more about teacher centered teaching rather than on collaborative approach in teaching. I could feel the act of teaching is like an act of depositing money in bank. I felt that me as a bank depositor, whenever teachers taught me in classroom, I wanted to put things separately in my mind. Therefore, the students were depositories and the teacher is the depositor.



In the place of two way communication, the teacher issues communiqués and makes deposit which the students patiently receive, memorize and repeat. This is the

¹³ Teacher centered approach – Teacher are being more active than students in this approach.

"banking" concept of education, in which the scope of action allowed to the students extends only as far as receiving filling and storing the deposits (Freire, 2005).

Therefore students were not proficient to develop geometrical meaning in algebra and learning. Moreover, while teaching algebra, the class would be effective if the teachers taught with visualization or geometrical interpretation by focusing on students centered teaching learning activities in classroom. Then only students could develop the lucid meaning in algebra and they could link algebra problem with geometrical visualization. So, we teachers may focus on teachers centered approach, using laboratory method with collaborative approach. When teachers teach in classroom, they might link their teaching style with geometrical visualization. Thus, we could bring about changes in algebra teaching.

Difficulty in learning geometry

In 2001 A.D., I was studying in grade 8. It means I was at the threshold of secondary level education. I didn't enjoy studying mathematics due to the teacher's authoritative behavior in the class and approach of teaching mathematics. Slowly, my interest in doing mathematics dwindled; I felt bored in mathematics class.

When I was studying in grade nine, I had to face problems especially with mathematics. I didn't get the chance to learn mathematics from the same teacher-- every year new teacher. Every year, my school head teacher would bring a new mathematics teacher to teach mathematics in my school. Whilst I was class nine, I got a new mathematics teacher, who was just coming to teach us mathematics and science from India. I knew that he was from B.sc¹⁴ background. Hence my head teacher struggled to bring him to our school to teach both subjects—math and science. I got three or four classes from him. He was no exception. He was able to solve

¹⁴ B.Sc- Bachelor of Science.

mathematics problems, but he was teaching in the same way as our previous teachers did-- just solving problems on the blackboard.

It was Friday morning. My mathematics teacher, Ram sir¹⁵ (Changed name) was readying to enter the class. He was a new teacher of mathematics. He always tried to enter the class in time. That day too, he came in the class in time. He seemed different, which we could read on his face. "Why he looked different today?" I asked a question myself. He entered the class and wished "*Good morning!*" We also wished him back "*Good morning, sir!*" Then he said "*Sit down! Thank you!*". In that class, he wanted to teach a topic from geometry because he had to finish the course within a week.

He divided the mathematics course into three parts—arithmetic, algebra and geometry. He planned to teach arithmetic on Sunday and Monday, Tuesday and Wednesday for algebra and Thursday and Friday for geometry. Since it was Friday, he was going to teach us a topic from geometry. On Thursday, he taught us a geometric theorem. And the same theorem he was planning to continue that Friday. Before starting the lesson he said to the class "*I proved three theorems in your yesterday's class. So you should memorize these entire theorems from which questions will be asked in your examination. To get pass marks, you should learn these theorems by heart. You have no other way out*".



¹⁵ Name of the person

a few minutes later in the class, I heard one of my friends saying in a group "*Oh! How difficult this geometry and how to learn these all geometric theorems!*" When I heard my friend's perception of mathematics and my mathematics teacher's perception, I was also bound to think "*mathematics is a very hard subject among the branches of mathematics and geometry appeared more complicated for me*".

Arriving at that stage, I concluded that mathematics subject was very hard for me and geometry was toughest of all other branches of mathematics for me. It all happened due to my mathematics teachers and their perception of mathematics.

"We don't have any other option but to learn by rote and memorization to pass the examination as well as to get good marks in mathematics subject."

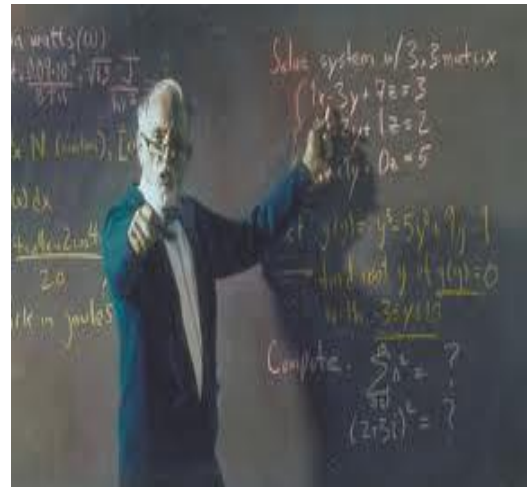
This was what the perception about mathematics subject was also perceived the mathematics the way my teacher did. A kind of math anxiety was developed in my mind towards mathematics. I had several questions about mathematics subject but didn't try to ask any question. Actually, I had a different type of habit--just listening to the teachers passively. That day I was not happy at my teacher's teaching. I planned to ask about mathematics-- why mathematics subject was very difficult compared to other subjects. I made up my mind to ask question with my mathematics teacher. One day before the class started, I attempted to ask my teacher questions, but could not. I decided to ask those questions with my mathematics teacher after the class.

He started to teach a geometry lesson for that day; in that I knew the lesson was about midpoint theorem. He said in the class "Today, *you have midpoint theorem to discuss.*

This midpoint theorem has a converse of midpoint theorem also. So I will prove precisely these both theorems in your class. Therefore, be silent while I prove these two theorems".

No student in the class seemed satisfied when he followed one way awareness method in teaching mathematics class. We didn't refuse his opinion about teaching geometry; we were simply saying "yes, sir". He started to prove midpoint theorem.¹⁶ Before proving that theorem, he wrote on blackboard the statement. I still have the theorem statement in my memory, which he was going to write on the board. He wrote the statement, as *"The straight line joining the mid- points of two sides of a triangle is parallel to the third side and equal to half of it"*. Moreover, he said in the class, *"This is a theorem statement of midpoint in examination. Sometimes, you will be asked to prove the theorem statement. Therefore you should learn this theorem statement by rote. Otherwise you couldn't prove this midpoint theorem at all"*.

That day I realized he was teaching geometry each and every time in his mathematics period without giving positive awareness to all of us. All the time from the beginning to the end, he repeated the same things. Perhaps because of the same, I, as well as other my friends, was frustrated in mathematics learning. Most of the time, he appeared rigid in the class and never encouraged his students to learn math. Immediately after writing the theorem statement, he moved to prove that theorem. He wrote the theorem statement from the government book that all students had to follow. Therefore, we had no



¹⁶ Geometrical theorem.

option but to use the same book to prove that midpoint theorem. He also used that same book to teach us any mathematics problems. He copied theorem statement from the book which was in his hand.

Over again in the mathematics class my mathematics teacher did not show any interactive process with students. He again said in the class *“Up to now we haven't done anything; we are just writing theorem statement. You have this theorem in your book and you can find it in your book. So you have to learn this theorem by rote. It is not new, he added, whenever I was in the class as a student; my mathematics teacher taught me the same process. At that time I also used the same process. Thus you also have to follow the same way to learn this geometry theorem.* He did continue that theorem as he shared his learning process of geometry in his life. Before starting to prove that midpoint theorem, first he made a figure with the help of the he was holding. He didn't make any new figure; he drew exactly the same figure as given in the mathematics text book.

When he drew the statement figure on the black board, I didn't understand the theorem and conceptualize the figure which Mr. Geometry¹⁷ made on the blackboard. In the meantime, my friends also did not agree whatever Mr. Geometry taught us about the midpoint theorem. Ram, one of my friends, asked Mr. Geometry a question- *“Sir, can't we make completely a new figure based on the theorem?”* .When my friend, Ram (changed name) asked that question in the class, Mr. Geometry sir was not happy. I saw his face blushed. He was very angry with the friend and said *“Nonsense! What I said just now in the class? Where were you then? Are you in the class? Don't ask such questions again if you want stay in my class. In my class, you have to keep quite. Otherwise you can go out of my class.* Being an auto-ethnography

¹⁷ Name of the teacher

researcher (me) or story teller, Luitel (2009) asserts his perception about teaching mathematics envisioning a traditional mathematics teacher as, “Don’t talk like a nonsense person! You should use formulae. How can you do mathematics by using your own method? Follow exactly the method and formulae I have given to you .That is what mathematics is all about”(As cited in Pandey, 2010).

As he was warning us in that way, we were scared of Mr. Geometry sir. While proving the theorem; we didn't dare to ask any question even if we had a lot of questions to ask about the problem. After making a figure, he copied the given cases to prove, and construction



thoroughly from the book. When he completed these three steps of midpoint theorem, Mr. Geometry said in the class "*To prove any geometric theorem, you will have to write these three steps with a figure. If you did not follow these steps, you will get only half marks in an examination. And so is the case with the S.L.C examination. So please, everybody, learn each of the theorems by rote as they are very important in examinations, especially in your S.L. C examination.*

To prove that midpoint theorem, he didn't explain more than a couple of minutes about that figure. He just read out the theorem and kept writing on the board. He didn't provide any other new approaches to prove that midpoint theorem. Moreover, to prove that midpoint theorem, he wrote in L.H.S¹⁸ side the statements and in R.H.S¹⁹ reasons. He copied everything from the book. So it didn't take a long time for him to prove of that theorem. Just copying from the book and no concept of

¹⁸ Left hand side

¹⁹ Right hand side

midpoint theorem! When he completed his task, he said in the class”, *everybody has to learn this theorem with statement by rote. I will ask or take test. You should prepare it for tomorrow. Otherwise, you will be punished.*”

On that day I planned to ask him the question before solving the midpoint theorem, but could not. One of my friends asked him a question. He got angry with him. Thus I didn't ask any question with Mr. Geometry sir. Mr. Geometry finished his class that day. I asked myself a question, why Ram tried to ask him questions although Mr. Geometry did not like being asked questions.

This story represents our teaching approach, which is a very traditional approach. In Nepal, most schools mathematics teachers rely on teachers centered method in teaching mathematics. Moreover, they focused mainly on rote learning and memorization. Still most of the students encounter problems with geometric part of mathematics. This story tried to reflect the situation of students and their teachers' attitude towards them. Whatever teachers teach in the class is to be learnt by rote and memorization. Students did not chance to think critically—just jug and mug theory! Whenever teachers do should be contextualized (Luitel, 2003). Geometrical problem also can be linked with their culture.

If teachers tried to link the topic with culture, students can easily bring their prior knowledge with visualization of mathematics problem. A teacher's belief plays a

A Mere Puzzling Mathematics

*A tourist presenting signs and symbols
On the canvas of big blackboard
Often turning back with scary eyes
A pin drop silence all around*

*Other hopeless creatures busy copying
No single chance for understanding
Being the mere artists of imitating
Among the crowd was I satisfying
With the foreign mathematics*

*I grew up with curiosity
But victimized with the anxiety
Always sought for illumination
But encountered with confusion
With foreign mathematics
As cited in (Sharma, 2012)*

significant role in the quality teaching mathematics (Belbase, 2013). Moreover to change teacher's belief, as my experiences say, it could be better to make an important aim of teacher training program (Sharma, 2012). If teachers participated in several teachers training program of mathematics they could changed their teaching style and tried to remove their rigid belief.

When I did my S.L.C in my village, there was not a college for higher education .Thus; I needed to leave my village. I had never gone far from the parents as well as from my permanent place, where I was receiving my formal education. Therefore, that was one of my big challenges in my life. But I had one big dream to go ahead as well to be a great person. These were dreams of life. I planned to leave my birthplace. Moreover my father also decided to go to Kathmandu. Before going to Kathmandu, I had thought of various things about Kathmandu valley²⁰ and its environment and adaptabilities. Until I arrived in Kathmandu valley, those various questions struck my mind. After the result of S.L.C was published, I headed to the Kathmandu valley to join a college.

When I entered the Kathmandu valley, I was completely unknown about Kathmandu valley and its environment. I felt very difficult to stay in the Valley but no option. I didn't have any idea how to choose faculty or stream. I wanted to study mathematics. I joined an education college centrally located in Kathmandu district. I felt no difficulty in that level. In the first class, one of my mathematics teachers said, *“Those who took optional²¹ mathematics in the class nine and ten will not feel difficult. Otherwise you need to labor hard to pass as well as to get good marks in this subject”*.

²⁰ Name of Place in Nepal.

²¹ Elective subject instead of other.

After his opinion about mathematics, I thought that mathematics would be easier than of school level mathematics because I took optional subject as mathematics in S.L.C level. By that way, I spent one year of my college life. I was happy with my college performance. When I completed my first year, I entered the second year of college life. My major subject was not different from the first year mathematics subject. My performance in the second year of the program remained satisfactory. After the second year of my course, one of my relatives invited me to teach in a school.

He offered to teach in one of the private boarding schools of Kathmandu²² in primary level. I did not know what to do. I didn't make any decision. But after a few months, I decided to pursue my carrier as a teacher of mathematics. So I started my career in teaching mathematics. I started my teaching career seven years ago. I started to teach math in primary level. In the first year of my teaching career, I got to chance to teach classes from one to five only. The school was a lower secondary school. There was another mathematics teacher who taught in lower secondary classes.

At first, I felt a little bit uncomfortable in that school because there was a senior mathematics teacher. He also had just completed the intermediated level having major mathematics from the same college where I had done my intermediate level. My journey as a teacher continued. I enjoyed my job. I knew that my first period was in class one.

Beginning as a novice teacher

It could be any day of April, 2004 first day of my school teaching career. That day, I reached the school earlier. I was both excited and nervous because it was first day my teaching career. Before going to classroom, I had my routine, which was available in

²² Headquarter of Nepal.

the school staff room. I got my first period in class one. I was a bit nervous and talked to myself *"oh! I have my first class in class one; how to teach in class one? Maybe it will be really difficult for me"*.

Before entering the classroom, I felt more uneasy than other normal days. Therefore it was my first day of teaching and I didn't have any experience in teaching in one class. I entered the class and said, *"Good morning and how are you"*? When I said good morning, the children stood up and greeted me with soft voice *"Good morning sir, we are fine"*. They asked me, *"Sir, how are you?"* I also didn't delay to reply their question because that day was my first experiences of teaching and I wanted to make them comfortable with my teaching mathematics. Before starting my lesson, I took their mathematics book from one of the students. The first chapter was about multiplication. I was confused. I had thought that I had to start with addition and subtraction without carry over.

I was standing in front of the students nonplussed. They were not silent in the class. Some of them were talking in the class. Those who were not talking were disturbed by their friends. They made the environment noisy. I didn't like their activities in the class and I was very angry with them. I accepted them to be quite and calm. But I was in my expectation. They behaved just opposite what I had thought before. Therefore I was got angry with students. I could not control my anger. So I said in a very rough tone to them *"why are you making a noise in the class If you are not interested to read then you can go out of the class"*.

When I spoke in a very rough voice, the classroom environment changed into pin drop silence. Thus, I got relieved to go ahead with that day's lesson. I continued and said, *"You may know this multiplication as you have read this multiplication*

table in L.K.G²³ class and U.K.G²⁴ class. So, you don't have to write this multiplication table on the board". One small boy asked a question, " Sir, why don't you don't write the multiplication table; if you do not write this multiplication table I will not able to multiply? Sir I know it just up to five only. So, you need to write the multiplication table on the board. I had the misconception that they had known the multiplication table therefore not necessary to write it on the board. I was more confused and thought-"oh! How to start? I don't know if other students also know the multiplication; without knowing the multiplication table, they can't solve the problem given in their exercise".

I was thinking in this way in the class room. A small girl (Sita) from the back of that classroom was asking with polite voice. *"Sir, we had read the multiplication table. Our madam taught us. Most of us know the multiplication table. So you can star this exercise sir. We have read this multiplication table up to twelve in Class U.Kg. And our madam asked this multiplication table each and every person in U.Kg. Then I asked Sita "Sita, can you say the multiplication table up to twelve? Sita stood up and said with a smile face "Sir I can do it as I studied this multiplication table in the U.K.G. Later I knew that she was the student of that class. She was a talented student of that class. Others at first before asking with "Sita" she dominated to her friend "Ram" also. At that time I was totally unknown about their achievement and I didn't make any plan to ask them individually that multiplication table. I did not even ask them to write on the board the table. After that, I asked all students to learn the multiplication table from their mathematics book by heart just in a few minutes in the class-- "All of you need to learn this multiplication table up to twelve by rote with a*

²³ Below class one.

²⁴ Below class one.

good understanding. After a few minutes I will ask you all. Therefore everybody started to read. Moreover, I warned them-the one who is unable to memorize this multiplication table will be either sent back to U.K.G or punished". When I threatened them in that way, I noticed some change on faces of the students. They looked very nervous and scared. All of the students were busy to learn that multiplication table by rote. I was just moving round the class room. And I watched whether they were reading or not. After fifteen minutes, I stopped them and asked that table. I said in the class *"Do you know all multiplication tables up to twelve?"*. Only a few students replied that they knew the table.

Again I added five minutes more for them to memorize the table saying, *"listen to me carefully, you have five minutes more. Within five minutes, memorize the table; otherwise you*



will be punished". They started to read the multiplication table. I was just moving round the class, helping them with their reading. I shouted at those who were not reading in the classroom *"Hey! What are you doing in the classroom; are you reading carefully? If you are not reading well after a few minutes, you will get to know you know what I will do to you all."* I didn't provide more time for them. The time was over. Again I said to the students *"your time is over; stop reading"*. I knew they memorized the table without understanding. I said to them, *"can you say all these multiplication tables without looking at your book?"* Then I decided to ask them individually the multiplication table. But unfortunately, I hadn't seen anybody ready to say the multiplication table. Whatever their problem was, I didn't care.

Immediately, I asked them a question *"Are you ready to tell the multiplication table?"*

Again no student seemed ready to answer. Then, I said to them:

“You must memorize all these multiplication tables; if you don’t know the table, don’t come to school from today onwards. Without knowing these all multiplication table you can’t do this exercise of this multiplication table. In my next class, I will solve one of the questions for you and you have to do the rest”.

All of them agreed with me. I selected a question from the book and solved on the board. I said to the class, *“All of you can solve the rest of the problem by this process”*. After I solved the problem in the class I gave them a problem to solve as class work.

As I gave class work, all were ready to solve the given problem and they were being passionate and some of the students were very lazy towards their work. Most of them were busy with their work but the period was about to finish. As they were busy, the bell rang. I stopped my teaching learning activities. I gave them home work and said, *“This much for today. Memorize all the multiplication tables for coming day”*. I thanked them and they thanked me back. This is how my first day class was over.

I started my teaching career a class in grade one. Later, I got chance to teach mathematics in lower secondary level as well as secondary level. I changed various schools to teach secondary level mathematics. But my teaching approach was the same in each level-- one way teacher centric approach. I took pride in myself as a mathematics teacher because mathematics teachers were considered superior in schools.

From the above story, I have tried to represent my preliminary career as a teacher in primary level. When I started my teaching career, I advocated for absolutists’ mathematical philosophical view. So in this epistemology, I thought

mathematics is considered one of the highest and purest forms of reason (Siegel and Borasi, 1994 as cited in Wilson, 2009). An absolutist philosophy is based on Plato's ideal in that mathematics knowledge is approached as a pure form of truth that transcends culture and time. Before I started my teaching career at that time I was not conscious of the theories and epistemologies that underline the teaching of mathematics (Ernest, 1990 as cited in Sharma, 2012). Moreover those who followed the absolutists view that absolutist claim that mathematics is perceived as a set of absolute truths meaning that mathematic is a subject of which always has correct and wrong answers , and there isn't anything in between (Shrestha , 2011). My past experiences showed that we used to follow absolutist view of teaching in mathematics. Here we couldn't get satisfied with students' learning. Students also feel bored therefore if we have possible try to focus on fallibist view. For the fallibilist, focus is not on the subject matter or content rather than on the process aspect of mathematics in which reality is constantly changing, knowledge is not static which in turn shows that mathematical objects are not static and absolute. The opposing view of absolutist is the fallibist. The fallibist view in mathematics is an incomplete and everlasting 'work –in- progress (Ernest, 1996 as cited in Shrestha 2011) imply to me that it is corrigible ,revisable ,varying , with new mathematical truths being invented , or emerging as by – products of inventions, rather than discovered (Shrestha,2011). Therefore the fallibist believe that mathematics is endless; we are able to bring our thoughts and creativity also. We can give value to the students when they bring new inventiveness in mathematics.

Chapter Summary

All the episodes discussed above represented the traditional approach in teaching mathematics. Teachers and students always have fixed previous determined

knowledge. Reading the above episodes, we can say that if the teachers teach without any prior knowledge in teaching of mathematics, students also learn the same way of teaching. In teaching algebra, we just give formula of any algebraic expression without describing its practical implication. While teaching algebra, teachers wrote formula only. They did not try to teach mathematics in an innovative way. Moreover, the given stories match the flavor of Habermas technical interest. Habermas technical interest focuses on structuring and making object and the environment (Shrestha, 2011). Furthermore the technical interest strongly believes in the controlled environment being influenced by positivism. Therefore the above story means that students were controlling the environment in my class. They were not free from other environment. So they were controlled by teachers; whatever teachers deliver to students that were fixed to the students for learning in mathematics.

CHAPTER IV

JOURNEY FROM TRADITIONAL TEACHING LEARNING PEDAGOGY

TOWARDS COLLABORATIVE TEACHING LEARNING PEDAGOGY

Chapter Overview

In this chapter, I have presented three episodes, which are based on my learning experiences from college level to university level. I have developed this chapter to address my second research question. Especially, this chapter tries to discuss my pedagogical practices. So in this chapter I have tried to present what my previous teaching/learning strategy was and when I became familiar with the collaborative approach in teaching learning activities. When I have come thus far, the collaborative teaching method is found to be useful in teaching learning mathematics. Between these three episodes, the first episode relates to how I learnt mathematics in the bachelor degree. Furthermore, through the second and third episodes, we get to know about collaborative approach in teaching mathematics. All these three episodes are principally guided by Habermasian three interest theories. Other relevant theories play supportive roles for developing this chapter. By the help of Habermas three interest theory and other theories; it promotes to build up this final chapter.

Moving in New Direction

When I had passed my S.L.C examination, I took admission in Himalayan College to continue my higher education. That college was centrally located in Kathmandu. There was no college in my village. Therefore, I left my village where I completed my school education. I moved to Kathmandu valley to join the college. Before I joined my college, I didn't have any idea about different faculties and

streams. I got to know about them after I joined the college. My interest was to major in mathematics.

For intermediate level, I spent two years in Himalayan College. During those two years, I was not motivated towards studies as the teaching approach in the college was no better than that of my school. Those teachers who taught us major mathematics in the first and second years

followed the same lecture method. Only the lecture method and writing on the board is not sufficient to build up the conceptual framework on pupils' mind; it should be visualized (Shrestha, 2011). But my teachers always taught



us by using lecture notes. When they were to teach mathematics in class the following day, they prepared a lecture note back at home and copied the same on the board in the class. Not only math but other subjects also were taught in the same teacher-centric way. No new approach but a lecture method!

Therefore, I got teaching learning activities in college similar to my school teaching activities. I started to ask a question myself, “*Why do the teachers in Nepal use the same approach the lecture method while teaching in class*”? Sometimes, I felt discouraged with my study because I had to memorize each and every answer, formula line by line. Otherwise I didn't have any other option to promote for my study.

Beginning of college life in teaching mathematics

It could be any day of March 2003, when I was studying in P.C.L²⁵ (intermediate) first year with math major at Himalayan College. I had/have dreamt to be a good mathematics teacher so the dream was a way of knowing, and it stimulates response and attempts to understand it and collaborates with other modes of cognitions (McNiff, 2008 as cited in Sharma, 2012). Therefore, I joined an education campus. During college life, I experienced a new environment different from my school life. Studying in a class with more than one or two hundred students was a very exciting experience. But unfortunately, the way teachers taught us was not satisfactory; they relied on lecture method, which is one way teacher centric method. The teachers never tried to interact with students. They were discouraging. One day, a mathematics teacher said to me informally outside classroom.

"In college, you should work hard work. Otherwise you will fail the exams particularly mathematics .Moreover, it is not compulsory for the teachers to complete course. Therefore you need to work on your own. Teachers also may care for the students teaching learning activities".

Even though I felt tedious with my study, I had an immense dream to study mathematics since the school days. So I was struggling hard with my study. I went regularly to college. One day in a major mathematics class, I was standing in the corner of a room where as my friends were talking to each other in group .In the mean time, my mathematics teacher entered the class and said, *"Today, we are dealing with coordinate geometry. Those who took optional mathematics in class nine and ten may find this topic easy; it would be very difficult for those who didn't take optional*

²⁵ proficiency certificate level

mathematics in school level. I was very happy at his ideas and talked to myself, "This mathematics will be easy for me because I took optional mathematics in class nine and ten". But he added, "You are studying in college. So you can't get chance to ask questions during the class; you may ask me questions outside the class". I can still recall how he taught us in class-- at first he wrote the topic on the black board. Before starting the topic, Mr. Coordinate sir said: "Today, I'm going to teach you coordinate geometry; I am going to solve three questions. So, be quiet while I'm teaching. I request you not to ask any question in the middle of my lecturer. Just copy whatever I write on the black board. Moreover, he added: I will explain the topic later if time permits". Mr. Coordinate²⁶ Geometry sir said in that way before he started to take the class. I wasn't happy at his saying and the method of teaching mathematics in the class. I did not find any difference between the teaching methods in the

My Mathematics Teacher

My mathematics teacher is like a ghost
Or like a villain in Hindi movies
Who always plays negative roles
With lots of foul plays with tainted souls

Mathematics class- a complete boredom
Where the learners enjoy no freedom
Facts, figures, signs, symbols and solutions
Enough for fear, tensions and frustrations
No care about the learners' interest and hobbies

Solving the problems his responsibilities
Following his teacher- a shameful heritage
What's the use of this meaningless mathematics?

As cited in (Sharma, 2012)

school and college where I was studying. So, Mr. Coordinate followed the same traditional teaching method—teacher centric method. That day, he had a lecture note in his hand. He wrote a problem on the black board from his copy and copied the

²⁶ Name of teacher.

solution from the same. Not only this, the teacher did not discuss with students the topic at all. Mr. Coordinate Geometry just copied a question with its answer and then a new question and its answer.

But out of dissatisfaction, a boy from the back of the class asked him a question: "*Sir, you have already solved a question and then another, but I didn't understand anything. If possible, please revise it once again, sir*".

Mr. Boy asked Mr. Coordinator²⁷ in a very polite tone, but Mr. Coordinate Sir's face turned red. It indicates that he was; angry with the boy. I had never seen him with that expression. With his red and angry face, he turned to the black board to teach the coordinate geometry. He was getting so angry that he threatened Mr.boy saying, "*Hey! Bhai it is not your school; you have come to Kathmandu to study in college. If you really want to stay in my class, you should follow whatever I do and say. Just follow me; otherwise you can drop out from this class. He further said Hey! Listen to me, whoever is teaching in this college teach the way I am doing. You cannot find anyone who teaches different from mine in this college. I have been teaching for more than ten years in this college; nobody can teach better than mine.*"

Mr. Coordinate got so angry that we didn't dare to ask him any question. Before Mr. Boy asked the question, he had been solving the first question. After that he wrote the second question on black board and copied the solution from his note copy. He completed the second question with its solution too. But I didn't copy the solution and neither did my friends although Mr. Cordiante sir said in the class, "*Have you completed this second question? If you have completed I will go to the third one which is the last solution for today. If have not finished copying I will provide just a*

²⁷ Name of the teacher

few minutes so that you can complete within this short time." No sooner had he said so than the whole class replied in unison, *"No, sir, we are coping and it takes a few minutes to complete this second number"*. He listened to our request and waited for some time. And then he started to solve next problem, which was the last problem for that class. To solve the third question, he used the same process that he used to solve the first and second questions. That day I felt bored in the mathematics class. Before Mr. Coordinate Sir started to teach us mathematics I had perceived math as an easy subject. Moreover, he had said in the class, before starting that day lesson, "those who took optional mathematics will find math easy. So I also felt that way .In school, my major subject was mathematics .naturally, I thought mathematics would be easy .but because of Mr. Coordinate Geometry sir, Mathematics was very hard for me. He taught us math in a very complex way, meaning a single way (lecture method).Moreover, Mr. Coordinate Geometry sir copied all those three questions with their solutions. He said," *You may be coping from the black board whatever I am writing there on the board. Altogether I have solved three questions for today. Everybody, you should start to memorize them for your examination. You don't have other option to pass your examination. Anyhow you need to learn all these questions with answers by rote"*.

In the intermediate level, I got this kind of teacher who taught me major mathematics. Although they were very experienced teachers, they did not apply innovative approach of teaching mathematics I didn't get any opportunity to learn mathematics in an innovative way. The only approach I learnt was rote learning. I used to memorize whatever my teachers had written in their lecture note provided to us. It was my approach to learning mathematics and others compulsory subjects also. Anyway, I learned mathematics. I spent two years at Himalayan College for

intermediate level study. After passing that intermediate level I planned to leave Himalayan College because I was not satisfied with the teaching approach there.

The environment there was not peaceful. Within the classroom, there was noise when teacher was teaching. And the teachers were not cooperative. There was no smooth relationship between the teacher and the student. Furthermore, teachers tried to show themselves as superior beings. The teaching method was simply the lecture method. Gradually, I got frustrated more and more with my study due to the large gap between students' and teachers' relationship. One day, a friend, who was studying in a private college, advised me to join a private college. He said, "*If you join a private college, you will get a good environment and all teacher will cooperate with your study. They will help you to remove your misconception and doubts from your mind. You will certainly be motivated towards yours studies*". My friend advised me in that way. I was convinced of his advice. As a result, I left Himalayan College and joined a private one. To do bachelor course, I could have joined another government in Kathmandu valley but did not do so. I had already decided to study at a private college. I had a dream to do better in my academic career. My new college was ABC College which was centrally located in Kathmandu Valley. Before admitting in ABC College, my friend said there would be a nice environment and cooperative teachers at the college. But I didn't find anything similar whatever my friend said before joining ABC College. In teaching mathematics all mathematics teachers used the same approach to teach mathematics as in my intermediate level. All mathematics teachers used the same lecture method to teach mathematics. No new thing but the same approach in that college, too! I needed to learn mathematics solutions by rote unquestionably.

Thus, our teachers gave us rote learning and drill approach in learning mathematics. Moreover, during those three periods I didn't have other options to learn mathematics and other compulsory subjects also.

This story represents Nepali classroom culture and traditional teaching learning practices in mathematics. In the given story, my mathematics teacher seemed to have followed absolutist philosophy. Absolutist philosophy emphasizes the teacher's role and responsibility in transmitting appropriate knowledge and skills to the learner by lecturer method or reading, which the learner then should take up and memorize (Toumasis, 1997). Wherever I spent my formal education up to bachelor level I never seen or felt using new approaches than traditional approaches in teaching mathematics. Moreover especially in this episode I have attempted to portray my concept about traditional teaching learning experiences. It has shown in this episode that the teacher who holds absolutist beliefs about the nature of mathematics tend to use traditional teaching models, so while teachers hold or move in fallibilist or belief towards fallibilist nature of mathematics tend to use constructivist teaching models (Ernest, 1991). In Nepal when teachers hold that fallibilist belief, they can change student's negative perception and provide the positive thought about mathematics teaching learning. Therefore, we all mathematics teachers try to follow the belief about that fallibilist nature of mathematics. When we all mathematics teachers easily accept both nature of mathematics in the context of Nepal, we can really improve the students' belief, anxiety and hesitation to mathematics.

Most of the college teachers didn't try to remain away far from the teacher centered method or lecture methods. In Nepal, most of the time, most of the mathematics teachers have given importance to drill and practice. They frequently say " practice makes a man perfect .So , practice ; practice ; and practice "(Pandey,2010).Thus, the

students developed their perspective of the traditional approach in teaching mathematic. The teachers give emphasis on rote learning, memorization and drill approach in learning mathematics. The Teachers in Nepal believe that as much as we practise, the understanding becomes more concrete and knowledge become im/permanent in our mind (Pandey, 2010). Even though most of our mathematics teachers have realized it; they did not focus on students' prior knowledge, students' capacity and students. Our own perception about mathematics and our mathematics teacher's perception about mathematics may be responsible for making our teaching learning process more meaningful and authorizing (Sharma, 2012).

Moving on a new path

My bachelor degree was coming to its end. It means I was studying in last year of bachelor degree. I started to think about my further studies. I enquired about a university, where I could pursue my master's degree. I was taking tuition classes with a teacher when I knew about him. He had done master degree from Sagarmatha University. He told a lot of things about that university and the benefits of studying there. But at first I didn't believe his description about Sagarmatha university .After a few days; I got a chance to interact with him. at last I was convinced of his description of the university. When I knew about the university in detail, I planned to join the University to pursue master degree.

I was preparing for my examination for last year of B.Ed. when the exam time table was published. I was appearing in the examination soon. I took the exams. After few months, the result was published passed the exams. My plan to study at Sagarmatha University



turned successful. But there were criteria to join Master degree program at the university. I was required to take entrance examination. Then only I could get chance to join it. I took the entrance examination and luckily got through it. After passing the entrance examination, I joined Master degree program at Sagarmatha University in mathematics education.

Journey through a new paradigm

It could be any day of February, 2011. That day I was preparing to go to Sagarmatha University for my study. That day was a special day because I was a new student of that university and was the very first class. I had a different kind of feeling in my mind about the first day class. I was very excited to experience what it would be like to be in the first class. It was around at 4 o'clock, when I was entering Sagarmatha University. First I reached the university canteen, where I stopped because there was still time left. The class was to start at 4:30. Therefore, I took a cup of tea in the canteen. I didn't stay for a long time there due to the limited time I had. After a few minutes, it was exactly 4:30. I was ready to enter the classroom. When I was ready to enter the classroom, a few friends only arrived in the scene. A teacher entered the class followed by the students entered the classroom. The teacher was coming in my class with smile on his face. He said "*Namaste all of you*". Whenever he said in his polite tone, we also didn't delay to reply and said "*Namaste sir*". We sat on the seat. Since all of us were new, we didn't recognize each other. It was the first class as well as first day. My teacher said to the class "Today is the first class of the first day. Before we start today's class, we need to know each other. So I'm starting my introduction ..." After he gave his short introduction, I came to know that his name was Ram sir (changed name) and he was teaching mathematics ((9-12) subject. Then Ram sir requested all of us to be ready to give our introduction individually.

We gave our short introduction. After the introduction, I came to know that we were fourteen students in the mathematics class. When I took admission at Sagarmatha University I knew that there was just a single period for whole day; I had to stay for three hours.

It was also interesting for me because in my previous college, I didn't have to stay for three hours for a single subject. I needed to study four five subjects a day. I felt different being in the class. I found everything new—teaching method and so on. Thus, I was hopeful that my study would improve because we got ample of opportunity to discuss the subject area. Moreover, when I entered the classroom, first I saw a laptop on a table. I asked myself a question why the laptop was there. Different things came into mind. Later, I knew through Ram sir that it was for teachers to use while teaching.

I had new feelings in mind for new things. Kincheloe, et al. (2000) state, "While the past informs and condition the present, every moment also contains possibilities for change and new direction" (Laura & spring, as cited in Sharma 2012, p. 135). So, I made my direction to a new environment of teaching strategy. Ram sir started that day's class. He said, "*Today we are ready for our study; and our laptop, projectors are also ready. Besides I had prepared presentation slides for today's class*". I learnt about a anew teaching approach in Sagarmatha University, which was completely different from other colleges where I studied bachelor degree. I had never ever thought things would work that way in mathematics class. It was a new experience in my learning journey. I was surprised to see that power point presentation could be used to facilitate teaching learning process in class. I thought at that time, "*How possible to use power point presentation slides to teach in the class?*". Ram sir said to us, "*Today I made a presentation slide on the topic of whatever I wanted to teach*".

Thus, I was excited to see how power point presentation slides were used for teaching. I had never seen that before when I was studying in a college. That was my first experience in teaching/learning journey. Therefore I can't forget that day. Ram sir showed us presentation slide of that day lesson, which was "collaborative approach in teaching mathematics". He showed us that first presentation slides in the class and he said, *"Today I have presentation slides and some papers related to this topic. We will read and interact with each other about this collaborative approach in teaching mathematics"*. It was completely a new teaching approach for me compared to my past university. Furthermore when I saw Mr. Collaborator with paper in his hand, I thought, *"Why he is bringing this paper into the class; he can provide it after this class"*. But Mr. Collaborator said *"Today I have paper on today's topic. As this is collaborative teaching approach, I will provide this paper before I begin my class. You need to go through it. After some time, we will discuss it with each other"*. Mr. Collaborator sir said and did different types of activities about that day's lesson before starting to teach in a collaborative way in teaching mathematics. In the beginning, I did not know what he was going to do. I was thinking-- *"How he is teaching? All work given to the students and how they will learn. I think this university also won't meet my expectation"*. I was thinking in that way in the class. I was reading whatever Mr. Collaborator gave us to read. That paper was concerned with collaborative approach in teaching mathematics. Moreover, that paper contained lived experiences of some mathematics teachers. As I was reading that paper I was feeling as if I was reading my own lived experiences.

That paper opened my eyes. But at first I felt irritated and bored. Mr. Collaborator Provided time to read that paper and the time was over. We informed

Mr. Collaborator sir that we had finished reading. We completed our task whatever Mr. Collaborator gave us to do. Then we sat quietly in the class.

Then Mr. Collaborator said, *"I hope you have read the paper and got to know about this collaborative throughout that paper"*. Meanwhile, one of my friends, Ram (Changed Name) said:

"Yes! Sir really we all found these activities very beneficial in teaching mathematics class. We haven't got chance to know about his word both as a student and teacher."

I was thinking in the same way as my friend thought about class. I had never got chance to be familiar with that collaborative approach in teaching mathematics. Therefore I was excited at that time to know about collaborative approach in teaching learning mathematics.

Moreover, I wish to talk about collaborative with others. I thought -- *"How is it possible to use collaborative approach in teaching mathematics and if I can apply this collaborative approach in my teaching learning activities and how effective it will be"*. Before my Mr. Collaborator sir taught us that way, I was not aware of the new approach of teaching mathematics. We didn't have that opportunity to discuss subject matter in detail in classroom. Arriving to that stage I wanted to know from Mr. Collaborator sir more about that collaborative approach in teaching mathematics. Mr. Collaborator sir asked questions in classroom and he said, *"You have got time to read this paper. Therefore whatever you have understood through this paper, you need to share with your friends."* Mr. Collaborator asked a question with my friend, *"Shyam, what do you understand after reading this paper? Could you share with your*

friend?" Shyam was excited to answer that question which Mr. Collaborator had asked him. Without delay, Shyam answered, *"Sir why not! I have got chance to know about new approaches in teaching mathematics from this paper. Therefore, I can share whatever I have understood with my friends"*. He expressed his views on collaborative teaching approach whatever he understood. After Shyam²⁸ had expressed his views, Mr. Collaborator asked another person to express his views on about the collaborative approach. He turned to me and asked me the same question-- *"Hari sir! Could you share with the class what you understand about collaborative method of teaching and how it can improve mathematics teaching through this collaborative approach?"* I was excited to share my perspective of collaborative approach in teaching mathematics and my teaching learning experiences in the past. In my teaching learning journey, I was not aware of collaborative approach in teaching mathematics. I came to know about that collaborative approach in teaching and learning mathematics through the paper given to us by Mr. Collaborator sir. I gave my own perspective whatever I understood by reading the paper. Mr. Collaborator sir said *"Thank you, sit down! You are absolutely correct. I believe you have understood about this collaborative approach"*. Mr. Collaborator didn't stop to ask the question. After my turn, he asked the same question to other friends. Moreover, Mr. Collaborator took the opportunity to interact with students about that day's lesson.

Again in my guess, he was not going to start the lesson. In the mean time, Mr. Collaborator²⁹ said *"Please, make four groups and share with each other what you have understood about collaborative teaching pedagogy. Do this process with other groups as well."* Then we all got ready to make four groups. And we didn't delay to

²⁸ Name of the student

²⁹ Name of the teacher

make four groups. After a few minutes, we made groups and started to share our own feelings and views with each other in groups. Before making groups I felt *"A little bit irritated. I was wondering why he was not starting to teach; what he is doing. Only activities in the class!* Moreover, I blamed Mr. Collaborator sir for not starting a lesson. I felt that he was doing all these things because he is feeling lazy to teach.

We started to interact with each other whatever we understood by reading, including our past experiences of teaching learning activities. We discussed the collaborative approach in mathematics. This time I felt happy because we shared our idea in group whatever we understood. After making group interaction, I realized that it was very good for us. I regretted blaming Mr. Collaborator. That was my mistake. Thus, gradually I apprehended that collaborative approach was more useful in mathematics subject as well as others subject. Moreover, I thought that class touched my heart. I thought of doing research on that topic. If I can complete this project, it will enlighten at first me and other mathematics teachers as well as subject teachers. Mr. Collaborator repeated the same process in the class. I thought to do thesis on the topic whatever I said above. From the second time, I started thinking of new ways of teaching mathematics. I reflected on why mathematics teachers tend not to be collaborative with students. Moreover I noticed a large gap between students and teachers. I may be the reason behind low performance in mathematics. It might be the reason why mathematics students did not show an interest in doing math.

We discussed in each group and said to Mr. Collaborator sir ³⁰*"Sir, we have completed our task and we are all ready to share our view"*. Mr. Collaborator said ok. After we said to Mr. Collaborator, he said in the class *"Ok, I hope you have completed your discussion in group. Then I am confident all of you have got more*

³⁰ Name of teacher

ideas about collaborative class in teaching mathematics think your attitude towards teaching math changed." Yes, that was really useful for me and I had a little bit of confusion about that collaborative classroom in teaching mathematics in the beginning. When Mr. Collaborator asked us to form a new group second time, I really felt irritated. But after we discussed in group I understood more about that collaborative classroom and gradually I avoided my negative view towards classroom discussion method.

Mr. Collaborator was ready to ask again question in our groups but he said at that time *"Now, I think you are ready to share your views in group. If so, please share your opinion in group"*. After Mr. Collaborator sir, we said that we were ready-- *"Yes sir, everybody we are ready; we can share our view without any hesitation. And we would like to start from each group"*.

Thus we started from each group to share our views about collaborative approach in teaching mathematics. Other groups were listening to us interestingly. Turn by turn we shared our views. This was how our discussion was over. We got chance to discuss again after we shared from each group. By doing so, we got new ideas from other groups. The class remained very interesting and all my friends borne positive response towards the method. And they felt that collaborative classroom really needed in teaching mathematics teaching at all levels. We interacted more about that collaborative classroom. After that, Mr. Collaborator sir started teaching us the importance of the collaborative classroom in teaching mathematics. Thus he added more about collaborative approach in teaching mathematics and he shared with us his lived experiences using collaborative approach. He shared both teaching approaches of teaching mathematics. My confidence developed when I heard his lived experiences toward collaborative approach in teaching mathematics. Mr. Collaborator

sir shared with us various experiences of teaching in mathematics some fifteen years ago. Moreover I realized that I had also similar kind of experiences whatever he said he had in his teaching career when he did not know about collaboration collaborative approach. So, in Nepal all mathematics teachers didn't get opportunity to use collaborative approach in teaching mathematics .The mathematics teaching process has not been changed at all. I want to make mathematics learning meaningful but I have never got chance to get “pure” knowledge of mathematics. If the teaching process of mathematics has cordial relation between day to day lives, I will encourage people to study mathematics. There are lots of problems in Nepal. Out of them, the non-employment is the main problem .Every student wants to have a good job. How can they learn mathematics the students do not know the application of learning mathematics? If mathematics teaching is according to the context of day to day life, the students feel that the mathematics is very important and learn, participate actively in the classroom. Moreover, they never hesitate to learn mathematics. In addition, our mathematics curriculum is not contextualized (Luitel, 2003) and teachers focused on one way teacher centric method. I have experienced all Nepali students whose experiences of mathematical learning for the most part are not pleasant because of the culturally decontextualization (Luitel, 2003) of mathematics (Wedeg, 1999 as cited in Neupane, 2012).

I made several presentations at Sagarmatha University during my master study in each semester since I got admission. I learnt a new teaching paradigm .So I learnt several approaches from my teachers .At this I became happier. Moreover when I had got several approaches of teaching learning activities in my university, I tried to apply in my teaching classes also. Gradually I became more satisfied with the teaching method at my university. I tried to use that collaborative approach in teaching

mathematics to my students. My students happily engaged when I was teaching mathematics. But in the past, I didn't try to use that teaching approach. At that moment I just used teacher centered approach; I had little idea about collaborative approach in teaching math. In that way gradually I transformed my teaching practice to other collaborative approach from teacher centered approach.

In this story, I have tried to represent my learning experiences how I got chance to know about collaborative approach in teaching learning mathematics. When I learned about the collaborative approach in teaching learning mathematics, the learning of mathematics in group/ collaborative work was really beneficial to me as I could learn every concept clearly and meaningfully (Belbase, 2006). In my journey of teacher and student, I didn't do any collaborative work; no discussion was made in the classroom with students and teacher. Before presentation of this episode, I held the belief that students are passive learners; they don't have creativity to construct new ideas to solve several mathematics problems; students should follow what I and my teacher ask to do. But this story has opened my eyes. I had in my mind the fixed perception about teaching learning in mathematics. So, this episode encourages me to select my research agenda. Moreover in Nepal we found that many of our students' formal education had been devoid of successful, mutual, collaborative, "conversational" learning (Smitherman, 2006). Especially when I came in first class of master degree, I got chance to know about the different methods in teaching learning activities. In my first day's class, it came across a new word of "Collaborative" approach in teaching learning mathematics. But before Mr. Collaborator taught in class I had not imagined of collaborative approach. Later I learnt about it and started advocating it. In the collaborative approach Stinson (2009) asserts that "Collaborative is the principle which assists in identity construction through join

efforts: ideas shared and commonly held social values held by others. This principle involves identity constructed through social interaction with others holding membership in the same group, such as teachers". Furthermore he advocated that collaborative is the principle which identifies membership individually and collectively.

Through the help of this story gradually I have tried to remove the teacher centered method in teaching which had firmly fixed in my mind. Now I made plan to change my teaching style from teacher centered to collaborative approach in teaching mathematics. Through the help of this above story I moved towards the use of the collaborative approach in teaching learning. So, collaborative teaching learning process benefits both the individual and the community. 'Good ideas converge under conditions of communication and collaborative '(Fullan, 1993, as cited in Talyer, 2007, p.114). Additionally, in the context of Nepal, we are required to show our teaching strategy orienting to collaborative approach in teaching learning mathematics through teacher development program which I have shown through my learning experiences transited from traditional behaviorist mode to constructivist mode.

Transforming into collaborative approach

It could be any day of August, 2012. It was really tremendous day for me because I had got chance to use new approach in teaching learning activities. I had got that opportunity to use a new approach in teaching as I was in my research methodology class in the third semester. The time for research methodology class was set for 4: 30 pm. In the research methodology class there were more than thirty students in the same class because there were students from mathematics education, English and educational management group. For that day I reached university before 4:30 for research methodology class. When I was in class, I had seen many friends coming in

class. Some of them might have been on the way. That day I reached there earlier because I wanted to see my research methodology teacher. Before he came in, I thought about the class and decided myself to persuade with research methodology because that was my interesting subject.

When I was thinking about that subject, the b research methodology teacher came in class with a good smile on his face. Dr. Professor entered the class and he said " *Hello! Everyone and how are you?*" We replied in unison " *Yes, we are fine sir*". Furthermore, I knew that there was not only one research methodology class. There were more than three, four research classes on different paradigms in education research. I took all those four research methodology classes; the more I attended the classes, the more confused I became on different paradigms in education research. Therefore I thought " *Oh! How to understand these different paradigms in education further! If I get chance to revise those paradigms. I will be out of confusion*". Whatever I thought at that moment, Dr. Professor said in the class " *Today we don't read new chapter but whatever you had read in previous class about different paradigms in education, we will revise the same. I had a hope that I would more about this paradigm of education*". Dr. Professor had decided to revise them. I became happy because I would have chance to remove my confusion with different paradigms of education research. Furthermore up to that time, I couldn't decide what methodology to take .So I hoped that day class would be more beneficial for me. Dr. Professor had brought some photocopy paper in his hand. He distributed the photocopy paper in class and he said " *Please, read this paper in five minutes. We will discuss in detail about this paper*. So I didn't delay to read whatever Dr. Professor gave me the photocopy paper because I was more interested in research methodology. Paper was all about different research paradigms in education. I started to read that

paper. It really touched my heart and I became happier as I got detail about how to apply different paradigms in education research .But that wasn't enough for that day really. I got new approaches on teaching learning activities. The time was about to finish in five minutes Dr. Professor said in class “*you may have completed this paper. So leave it to read now. We will discuss in group whatever you have got in paper*”. In research methodology class, there were altogether thirty students in class. Whilst he was saying to discuss in group I thought “*Oh! How is going to make a group; I stayed with my friends because I felt comfortable with them*”. I sat as I planned. At first Dr. Professor said “*Here, all of you are thirty students; we will make six groups. So I request to you to take your seat by getting your number*”. He started to nominate with number system. I got six numbers so I became in group six. I joined group six as Dr. Professor said. I didn't get chance to sit with my previous friends. Therefore I felt a little bit thorny. When I moved to group six, I tried to communicate with my friends because I wanted to discuss in group about whatever Dr. Professor mentioned previously. We were required to discuss more about several paradigms in education research. I spent for few minutes to interact with friends in the group. They brought very good points about research methodology in education. Moreover, my confusion got removed as I got more things about in methodology. But a few minutes of our discussion in a group, Dr. Professor said “*I know, you discussed well in your group but it is not enough .So again I request all of you please share with other groups whatever you got through the given paper and classes of our research methodology in the past*”. There in class every group was ready to share their own understanding in the given task. They started to share their view whatever they knew through past classes and after discussion in groups. I knew more in class; one had started to share with another group about research methodology and different paradigm in education.

When every group shared its view, I got more ideas. It helped me to remove my confusion. Someone from a group said *"Oh! It is very good just because we come to know more about this research methodology and method in education"*. At that moment I also became happier because I got chance to be more clearly with different research methods and methodology in education. Then, I finalized my research method and methodology in education. When I came up to that time, it was around 6:00 p.m. Dr. Professor said *"now you have break time for ten minutes. After ten minutes we will be back in the same class and same place to discuss more about different research paradigms."*

Everybody we returned on exact time and we took the same sit and place. When we came back in classroom Dr. Professor also came on time he said *"Oh! Everybody you came on time ok thank you. Now we will have other task from this task also I do hope maybe all of you will get more knowledge"*. He said in class I became more happy because of I got chance to know the second time of several research paradigm. In class all we were became happy up to at that moment after getting new adjustment with new friends than previous time. But Dr. Professor he said in class *"Again I have planned to change this group however you are taking your sit and now everybody you will get one research paradigm topic within this topic please you should go thoroughly . After getting this your research paradigm you need to share your own idea to other group"*. Again Dr. Professor changed our group however we stayed in previous position and after changed our group in each group he provided one research paradigm topic also. So again I got other new friends but coming at that juncture a little bit I tried to remove my discomfort with new friends because of all of we knew already Dr. Professor did same group activities in before break time. But it was again I got other new friends so a little bit fell uneasy anyway I tried to

communicate with them. They were also tried to be familiar and communicate without any hesitation .I know that we got in our group interpretative research paradigm in education. In Which Dr. Professor provided me and my group that was a little bit familiar with me due to that from first when I started to take this research methodology class. I was more advocated with interpretative research paradigm in that way we discussed for few minutes in our group whatever Dr. Professor provided research paradigm in each group. After we discussed Dr. Professor said "*I do hope maybe everybody you have interacted with each other and shared your idea to your friend .so again request to all of you, please whatever you confer in your group those thing contribute to other group according what you have got research paradigm "*. After Dr. Professor requested there all we were prepared to share our own good understanding and each of them shared in different paradigm of research paradigm in education. Moreover, Professor tried to clear with link of many more example .Therefore it was more memorable day in my student life I never got chance to learn in this way.

After when I got such teaching learning activities to students I also planned for used my teaching learning activities in class. So I highly advocated with collaborative approach in teaching mathematics .The collaborative learning has closely associated with a progressive pedagogy. I have got teacher centered learning is very far from other students centre in the collaborative learning therefore specially focus on students centre teaching learning. Furthermore in collaborative learning, as cited in (Vosloo, 2004), Darling & Hammond (1997) asserts that collaborative learning occurs between and among learners when they are organized into carefully structured and guided groups to share ideas , test solution to problem, design and carry out experiments , or conducted teach –back.

In this story, I have represented my factual learning experiences of university level from traditional approach to collaborative approach. When I came at that juncture I really got more collaborative approach in teaching learning activities. Before I arrived in the third semester for my master degree there I got collaborative approach in teaching learning .But comparatively with others semester of my master degree whilst I was in third semester. In third semester of research methodology Dr. Professor gave very different way of collaborative approach in teaching learning activities. So, I came in third semester of my master degree. I was extremely changing in transformative learning (Mezirow, J.2007).Transforming learning (Mezirow, 1991, 1995, 1996; Carton, 1994, 1996) is the process of effecting change in a frame of references. By the help of this transformative learning I developed my autonomous thinking as far from the previous learning approach (lecture method). For instance, a psychoanalytic view of transformative learning associate it with the process of individuation which involve a sense of empowerment , a deeper understanding of one's inner self , and a greater sense of self responsibility (Cranton, 2000). So in my experiences of given episode I found that there must be something new for knowledge construction – freedom, independence to learn , free to interact to teach other – students versus students, students versus teacher so that there is no boundary for participant to construct knowledge (Shrestha, 2011). Additionally, I believe that there must be an interest in freeing persons from the domination of technical interest and deceit of the practical interest. So, where students learn new knowledge there must be any controlled environment to constitute knowledge by interaction with the other students and teacher in the process of learning.

Chapter Summary

In this chapter, I have tried to reflect on my education journey of bachelor level to master's degree. The readers of this journey will come to know how novice researcher has been selected for master degree this project of research topic with collaborative approach. Moreover, how I was being a novice researcher. I have tried to represent my past experiences of first college life of teaching style and my master degree teaching approach in teaching learning activities. Whilst I was coming at this stage, I was so highly advocated with collaborative approach in teaching learning activities. It promotes the collaborative approach than other traditional approach in the context of Nepal as well as other country. Furthermore, while I was coming in this state I have got changed my learning experiences. I have moved to transforming learning rather than whatever I got in my past college life and school. So Transformation happens when people managing a system focus on creating a new future (Sharma, 2012) that has never existed before, and based on continual learning a new mindset, take different actions than they would have taken in the past (Daszko & Sheinberg, 2005, as cited in Sharma, 2012).

CHAPTER-V

JOURNEY FROM TRADITIONAL TEACHING PEDAGOGY TO COLLABORATIVE TEACHING PEDAGOGY IN MATHEMATIC CLASSROOM

Chapter overview

In this chapter, I have represented three stories which are linked with my third subsidiary research questions. These three stories portray some of my experiences of teaching and learning in the school level. Here, I have presented my experiences of teaching and learning and use of collaborative approach in teaching mathematics through the narrative inquiry.

Thus, I have shared my own experiences of teaching learning in mathematics and also focused on the use of this collaborative approach in teaching mathematics. This chapter shows how student's belief and practice are moving from traditional approach to the collaborative approach. This chapter focuses on the use of collaborative approach in mathematics teaching among mathematics teachers. Moreover, the traditional teaching and learning doesn't have positive impact on the students understanding.

Turning point in teaching method

It can be any day of August, 2012. I did not know why the day seemed to be different from other days. This type of question and feeling came into my mind. Also, I asked myself questions but I didn't know. I always had the same routine life but at that time I was a little busier than other time. On that day, I woke up early in the morning. After doing my daily activities, I opened my laptop. I saw my proposal, which was on the desktop. In my research proposal, I included the research methodology, which was a participatory action research but I did not know, why? I thought of changing my

research methodology; I thought about my research proposal once again. But I was not sure whether to use the same research methodology as I was using it for the first time.

At first, I determined to do action research, and my research instructor also said to me, "*Your research seemed to be a participatory action research and you could follow the same*". But after a few weeks I realized that this research methodology was new to me. So I changed my research proposal and decided to apply auto-ethnography method in my proposal. The methodology was auto-ethnography because if I used this approach in my research without any complication, I could highlight the importance of collaborative approach in mathematics teaching referring to my past experiences as a student as well as teacher life. It was an appropriate research methodology for my research. Once my research methodology was fixed, I made a plan to initiate my research too. Suddenly I was forced myself to begin my research on the same day.

I planned to go to school earlier that day. I started at eight o'clock after having breakfast. My school was far from my house. I might have arrived at school before nine o'clock; no teachers had arrived at the school. I prepared my class to teach mathematics of grade seven. There came various things in my mind before I did sort out plan and activities in teaching mathematics through collaborative approach. But after a few minutes, I finalized the today's plan to use collaborative approach in teaching mathematics of grade seven. I learnt about the use of collaborative approach in teaching mathematics in my university. Whilst I was preparing my plan, the school bell rang; Ting, Ting...I didn't have much time because I had to go to classroom in the first period. I went to class eight in the first period to teach mathematics. After completion of the first period, I had to go to class nine in which I were to teach

optional mathematics. My students were engaged in their work. While the students were busy with their work, the third bell rang.

When I entered class seven, there all students said to me "*Good morning, sir*" and I replied them, "*Good morning and sit down*". They looked quite. That day was Tuesday. So I needed to teach algebra to my students. I was teaching through the teacher centered method before I started to take that class. I was used to teacher centered method.

Mainly at this glance, I was advocated for absolutist view of mathematics knowledge. When I was influenced by absolutist view of mathematics knowledge, I thought mathematics knowledge consists of certain and unchallengeable truths. Moreover, mathematical knowledge is made up absolute truth and represents the unique realm of certain knowledge , a part from logic and statements true by virtue of the meaning of terms, such as ' All bachelors are unmarried'(Ernest, 2004).

All the classes focused on students centered teaching. For that day I needed to teach in a different way. Whenever I taught last year in others school, the same way was used in this school, too. That day I had planned to teach math in a different way to class seven. I knew the lesson was simplification with word problems. I wrote topic on the board with a marker. I had an exercise of" simplification", and to solve that given problem I needed to use a formula.

So, at first I asked some questions to those who were looking frail in my previous class. I asked the students a simple question. I had discussed that type of question last year when they were studying in class six. The question was as; if the length of rectangle is $(2a+3)$ cm and breadth is $(4a-3)$ cm, find the area and perimeter of rectangle. So I asked them the formula of perimeter and area of rectangle before giving them to solve the given problem.

I asked question in the following ways in class;

I was looking at Ram in class; he looked unhappy with me. It might be because he wouldn't be able to answer my question. I could understand it as his face looked red. I came to know that he would not be able to answer my question. Then I asked him the following questions.

Me: Ram! Stand up .Do you know about rectangle? What is an appropriate formula to find out the area of rectangle?

Ram: yes sir,

Me: Sit down.

In polite voice, he replied" *yes sir*" but he didn't say the formula of area of rectangle and I said to him "*Thank you sit down*". Again I moved to the right hand side of my class and directly my eyes went to other student, May be he was thinking of getting asked the same question which I asked Ram just before.

Me: Kapil, do you know the answer of the same question?

Kapil: Which sir? Ye... sir

Me: May be you also don't know?

Kapil: Yes sir I can say this question's answer, sir, to find out the area of a rectangle, we should use $L \times B$

Me: Very good, sit down, Kapil.

By this time, I had asked two students the question before solving the problem. When I asked both of them; they appeared weak at mathematics in my classes. Likewise, in

the class I did such activities to solve the given problem. During the interaction with students in the class, I saw all students were happy than other days. So, I continued such activities for them .Again I asked another question to a girl. When I moved to her, she felt uncomfortable. But I didn't discriminate between boys and girls in mathematics class. I always tried to give equal opportunity in mathematics class. As a result after a few minutes, she overcame her uncomfortable situation and got ready to answer my question.

Me: Rachana, how are you today?

Rachana: Yes sir, I'm fine.

Me: Rachana, do you know which formula is appropriate to find out the perimeter of rectangle?

Rachana: It is very easy sir; we had already learnt this formula in class five and six. So we have a formula to find out of perimeter of rectangle that is $2(L+B)$.

Me: Very good. Thank you Rachana, sit down.

I was ready to teach in class when I took a problem of area of rectangle and perimeter of rectangle. I solved one question with a similar problem. So, most of the students knew how to solve the similar kind of problem as I did in the class. As I had provided one question to all students, they were also ready to solve the problem. And most of the students were excited in today's class. Especially the question was like if the



length of rectangle is $(2a+3)$ cm and breadth is $(4a-3)$ cm; find the area and perimeter of rectangle. I have provided that question to the class. At that moment, students also didn't feel difficult to solve the problem, and they did their work sincerely in class.

I also moved towards each and every bench of the students while they were doing their work. To solve this problem, I didn't give a long time and there was time limit. The students were ready to submit their work within a short time. I said to them " *Time is over. So please submit your class work fast*". So every student submitted their work to me and I checked their work sincerely how they had done. When they submitted their answer sheet, they did well. But some students did mistake on their answer sheet. Those who did mistake seemed to be low grade achiever in mathematics. Altogether in mathematics class, eighteen students participated every day. Among eighteen students, only five students did mistake when I had provided class work to them. Thus I divided them into three groups -- each group comprises six members. After checking their copy I returned to them. And everybody was coming to know wrong or right their solution individually. Whilst they got their copy, they were busy for a few minutes to check each other's answer and compared their copy. But who did mistake to find out of the solution to the given problem. Why I saw worry on their face. Maybe they were sad because they couldn't write answer though it was easy question in comparison to others which they had done in class.

I came to know through their mistake and question was also not more complex than other problem. Moreover, they had done that kind of problem in the same class before. Until this stage all students were engaging in a group and they had started to interact with each other in a group. They got very new environment in this class. Already I mentioned properly mistake and right in their copy. Accordingly those who did mistake to solve of the problem, they were helped to avoid their

mistake by their friends who had written correct answer .And those who did correct were also helping each other. At this moment I also moved to three groups and I helped them with their problem.

In this class, I felt a bit different from the past classes and students were showing different attitude in class. Just I facilitated for each group; they interacted with each other in each group .Within a short time, they completed their discussion. After interacting in class I found all students happy and excited. Suddenly, at that time one girl said to me:

"Sir, today's class became more joyful and interesting. So sir, please better to use the same process in the next classes, too."

As she requested me, I wasn't able to reject her request and I replied to her" *ok we can continue this same approach in the next classes and let's hope, in next class may be you will enjoy the class more"*. Then I heard the sound of a bell and rang the bell Ting, Ting, Ting, Ting. So I did complete my period in that day's class and I gave homework to them.

This story indicates that the students had difficulties to find out the area and perimeter of rectangle. As I wrote this story interrelated with rectangle, it was not new for those students. Rather they had understood about this rectangle and to find out the area and perimeter in previous class. But still students had a problem to find out the area and perimeter of a rectangle. It is because they are not able to connect their bookish knowledge and their daily life experience to the question. Thus, students are feeling a little bit difficulty in this problem. Before arriving at that moment, students were taught by using teachers centered. I also didn't have any idea to teach in a new approach; such as collaborative approach and students centered teaching.

Thus, from this story I attempted to say that I was advocating in favor of the absolutist view of mathematics. The centre argument against the absolutist view of mathematical knowledge can be circumvented by a hypothetic – deductive approach (Ernest, 2004). Moreover, absolutist view, thus, according to Hempel (2010) the validity of mathematics derives from the stipulations which determine the meaning of the mathematical concepts and that the propositions of mathematics are therefore essentially ' true by definition ' (Feigl and sellers, 1949, p. 225 as cited in Ernest, 2004) .I never tried to teach as far from the teachers centered. Here I wanted to touch two mathematics philosophies-mathematics as fallibilist or absolutist in my journey. I presented my position as a teacher infallibilist group (Lerman, 1990 as cited in Khatri 2012) believing that mathematics is very static, unaltered and out of their knowledge system. Moreover another literature about two philosophies as absolutist and fallibilist (Ernest, 1998) gave me an insight that I have placed my learning and teaching journey at absolutist frame.

Moreover, this story tells us that students appreciate and like the subject which focuses on activity based or collaborative approach in teaching mathematics. Teachers also require being friendly while teaching in class and it not essential to make students understand. Moreover, to prove myself in my teaching life before composing this story I was not aware of this interactive approach in teaching mathematics class .But now if I get chance to use this approach in teaching mathematics, I will avoid the traditional approach and negative belief practices in teaching mathematics of different levels.

I found that all the students preferred this collaborative approach rather than other approaches. I used teacher center method in teaching mathematics. Thus, if we prefer this approach in teaching mathematics class, may be they can avoid their

negative belief and practice about mathematics. Furthermore, Vygotsky also examined how mind develops within social interaction transforming the biological legacy through the group's cultural legacy. So knowledge is constructed through a group. It would be better to use collaborative teaching method in mathematics and it helps to promote learning mathematics for those who are more interested to learn mathematics.

Learning intricacy in decimal number

In 2011, it might be any day of August. As usual, I was busy with the same work of teaching in school. That day I had the same schedule to teach mathematics. Therefore, I was busy. Until I came to this stage, I spent more than five years in teaching different levels in Kathmandu valley. I knew I had to teach a lesson about fraction and decimal in class. That day time was around at 10.45 am and the school bell was ringing, Ting, Ting. Whenever the bell rang for the second period I was teaching mathematics in that class in which there was my first period.

Thus, as soon as possible I completed that class within a short time and I got ready to go for the next class in which I had to teach mathematics in an energetic way. I entered the class and the entire students said with polite voice "*Good morning, sir!*" I said to them, "*thank you, sit down.*" and they got their own seat in the class. I was standing in front of the students whereas students were also showing a little bit different attitude but I didn't know. When I felt different attitude of students in the class, then I asked "*can I say one joke today?*" They looked more enthusiastic that day than other days' classes. Consequently, I also didn't delay to tell the joke in class, and I told them a joke in class. I got all students smiled. After that I started to teach in class.

That day the lesson was on fraction and decimal, I wrote that day's lesson on the white board with a marker pen. When I was writing on the board, unexpectedly I heard one girl's sound from the back of the class. She said " *oh! How confusing is today's chapter in mathematics*". I knew, maybe she was sharing her views with friends not with me. But I also didn't ignore her opinion about fraction. so I asked a question to that girl: Sita, (changed name) "*Why do you feel this chapter is difficult?*" She replied me "*Sir I have been doing this fraction of multiplication, division and decimal since the primary level .but still I have confusion in multiplication and division of decimal number*" I gave positive response to that girl.

When she said her real problem by heart I also realized myself and thought oh! It is a real problem in mathematics class and perhaps, I faced the same kind of problem in teaching mathematics class. When I was teaching mathematics in primary level, I thought of a question in mind, "What is the possible way to avoid this type of dissatisfaction of students? How can we make proper understanding with fraction and decimal of number?" These various type questions arose in my mind and I concluded that it was a rare problem in mathematics teaching class. Furthermore I thought why students always felt complicated to do multiplication and division of decimal number.

I was teaching this decimal, fraction of multiplication and divided in class there might be all students were not coming to understand. When I taught this decimal, fraction of multiply and division in class, that time I didn't get a complete satisfaction where I was teaching other classes in different area. But that day I would like to teach decimal number of multiply and divided in that class. Before starting of that chapter, I took a few minutes to revise of yesterday's and past classes. When I revised in the class they had got chance to revise the courses I had already taught in previous classes also. I started to teach multiplication and division of decimal number

in the class by the precious way specially I focused on students centered teaching approach.

In addition, I focused more on collaborative approach in my teaching mathematics class. When I gave some rule to do multiplication and division of decimal in that class a few students came to understand. Until coming at that stage students were not being depression, as a result I thought different why? They felt more enthusiastic to learn today's chapter. Moreover at first I gave class work to all of them concerned with multiply and division of decimal number. Then after, most of them did on time their work and came to show me. But whilst I provided such class work most of them did mistake and I got a few students only did correct which one I gave class work. As I checked class work suddenly I asked question those who did correct in their solution.

I asked Shyam,

Me: (changed name) Shyam³¹! Do you have any other idea to solve multiply of decimal? Suddenly he replied me.

Shyam: Why not sir?

So I requested him to come in front of the class but at first he didn't feel comfortable requested of my purpose to come in front his friend .At that time might be he felt uneasy because of I hadn't given this type of opportunity in my teaching mathematics class before that class. Again I requested to him, "*Please Shyam come here let share your idea with your friends*". By the second time of my request he was ready to come in front his friends. Whilst he came in front of his friends, the question was ready on the white board and he solved by two approaches of that same multiply and division

³¹ Name of student (Changed name)

of decimal which one I provided class work to them. Whenever he solved the multiply and division of decimal number of given question after that I was being more happy because I didn't think, he was able to solve of that problem by different approaches in the class.

There in class, I got other students also had written the correct answer in the other way which I gave as a class work. I gave thanks to him and again I raised question in class, others I said there " *Are you ready solve of this same question by the others ways?*" when I raised question from the backside of class there suddenly I had seen one students was raised his hand in the class. Whilst I came at that time I found that all students were being more excited because they might have felt that their friend had done it and they could also do it For the second time I called to next boy to solve the same problem .Without any hesitation he was presenting in front of his friend. After coming there he solved that given question by different way when just one boy had solved the same question answer.

Coming to this moment, I was being happy in my teaching life. During the completion of solving solution of question through different approaches by two boys in the class, I felt different situation and I didn't accept to them such type of solution of that given question. I gave continuous my teaching learning activities in the class. There I had time to complete this period. Thus again I was ready to provide another class work to them upcoming at this moment most of the students were showing too much enthusiasm in that day's class. As I provided the class work concerned with multiply and divide of decimal in class ,I had seen there all students were more engaging in their work by the honestly . I guessed whilst they were participating the second time to do their class work there seemed to be no large gap between understanding to solve of the problem whereas I gave second class work .

Thus most of them did in short time due to not being more confused with decimal. After completion their class works they were being more hurry to submit work. I also didn't reject to their passion with study so I checked class work precisely and returned to them. But when I checked class work in the class there I got few students did mistake in their copy. Furthermore I divided them in three groups for them and each and every group they were trying to sit round wise in class. There were six members in each group. I requested to them "*please all of you better to check your copy and compare with your friends*". Getting my permission they were engaging in each group and those who did correct they tried to share their idea with others friends who had not given correct answer.

I found in each group that those who did wrong in their class work were also didn't feel any hesitation asking their question with friends. As entire students were being engaged in their own work, I was also not being less passionate. At that time, I moved each and every group and I facilitated to them while they felt complication situation in relating to decimal multiplication and division problem and asking their encouragement of question to decimal multiplication and division number system. Those students who had done mistake came to know that where they did mistake and they solved the problem again by themselves. I got it because all of them from this class avoided their misunderstanding towards multiplication and division of problem in decimal number system. Might be in this time was also going to be over that school provided time to teach mathematics.

Thus I was also coming to end of this class but suddenly one student asked one question; Sita: "*Why didn't you use such type of approach in class room in past years?*" Listening her question, I was being unconscious and confused for a few minutes oh! I thought some my past experiences of teaching profession. After a few

minutes I replied her *"Sita before this time I was also not aware to use this type of classroom activities in teaching mathematics and really I didn't get chance to know about it during my past students life as well as teacher life "*. For the first time she didn't believe me might be thought that I was teacher and she felt other teacher's knew everything such their mistake thinking so she didn't aware with me. But I said my real thing about my teacher life as well as student' life.

All of them were more enthusiastic and I saw everybody happy in that class. Everybody was being more confident to do multiply and divide of decimal number and fraction also. Students requested me to use this type of approach in teaching mathematics I also promised to them use of this collaborative approach in teaching mathematics. That day I was more memorable day for me still that day gives happy in my teaching life too.

Through the above story, we come to know that it seems rare problem and more students have problem with decimal than with rather than other number concept. Always they have misconception of decimal and fraction number system. As my experienced I have got that there seems to a large gap between students understanding of natural number and their understanding of decimal number. Moreover given above story represented that multiplication and division of decimal number are even more challenging to students in mathematics.

Thus, students' computation skills on four operation of decimal are just rote learning and devoid of any meaning. I know that with this reason, the research aimed at firstly, telling students ' misconception of decimal number and secondly, understanding whether the connections between conceptual and procedural knowledge exists when completing decimal tasks (Lai and Tsang, 2009).Others common misconceptions often result from a lack of feel of multiplication or division

of decimal number system. In decimal number system Brown (1981b, 1981) found that about half of 12 years – old student and a third of 15 years old have difficulties in understanding decimal. The story makes clarity that decimal number of multiplication or divisions are not useful in their daily life and always they got challenging in their life so they think it is appeal learning. It makes students less interest in learning decimal number of multiplication and division.

Teaching Geometry with prophecy

It might be any day of August Year; in that I felt tired than other days. So in that day, I woke late in the morning .When I woke up, time was exactly six o'clock but other day's I didn't use to for a long time. Even I did the same activities after waking up in the morning whatever used to do others day also. On that day that Wednesday, I had an important work outside my house. So I came out from house before seven o'clock and I went to take vehicle at station. I waited for vehicle at that moment and I didn't wait for a long time to take vehicle. Easily I got and I went to complete my work.

I returned to the school. There were morning classes of class nine and class ten running. I arrived in the school before school time because I had an extra class in class ten .As I took all classes first to second period by the analogous way what I taught on last days. It was on Wednesday, I was in class of second period might be that period was going over the end of second period. The school bell had been ringing, Ting, Ting, Ting; already third period had started so I was ready to go to class seven for teaching mathematics. Whilst I entered to class seven there all students said to me "*Good morning sir*" with their smile faces. I also replied to them "*Good morning sit down*" and I asked to all there in class "*How are you?*" At that time most of the students replied "*we are fine sir*". Suddenly they asked other question to me

"sir why are you asking such question today". I said to them "nothing special just I wanted to know your feelings for today's class".

On that day, it was second class to use the collaborative approach in teaching mathematics. I had just taken one period on last Tuesday but all students were getting so excited in the class, might be they knew about the use of collaborative approach in teaching mathematics. Also they would be beneficial by using collaborative approach in class. Since yesterday, I thought myself that the use of collaborative approach in the class was for them. Thus I got change of the student's attitude in the class that day also I had a routine for to geometry of quadrilateral and I knew that chapter was also same. Although I revised the last days lesson to them and I asked the some questions. I asked the questioning in the following ways in class;

Me: Bishal, Do you know about the quadrilateral?

Bishal: Sir May be I had read in previous class but today I got confused with this question.

Me: It's not the problem Bishal.

Again, I forced him to ask other question related to quadrilateral. I was standing in front of his place but I didn't see any fairness on his face because I gave this same opportunity and I had asked the same question in my past teaching classes also. Thus coming at this stage he avoided his fearness with teacher and friends and he freely interacted with teacher as well as his friends in a group also. So I asked once again other question and I thought might be, he was able to say something about of quadrilateral. Accordingly to my confident I asked next question to him.

Me: Bishal, at first you said you have confusion about the quadrilateral, but now can you say it again?

Bishal: Sir, at first I was being confused but now I came to know in my mind about quadrilateral in geometry, sir quadrilateral is closed plane figure having bounded by four line segments.

I asked second question to him .At that moment, I didn't believe such correct answer but he made me surprised because he was not extraordinary students in my mathematics class. I started to think about him because I had really got surprise .oh! Why? I didn't use this approach in class of mathematics teaching and why? I didn't get opportunity this type of approach in teaching mathematics. By saying his correct answer made me very happy so I said to him " *Sit down and thank you very much* ". As I thanked him in class most of the students said him "*Waa..... Bishalthank you very much*", I also appreciated his good progressing in mathematics .Still I didn't start to teach of quadrilateral. Once again I made a plan in mind to ask other question to girls group, while I made plan to ask question in that group and I moved towards girls group there I hadn't seen peace might be at that time they were interacting each others in a group .So I asked next question for a girl there in a group she was also pretty much engaging in a group.

Me: Nita (changed name), just your friend have said about the quadrilateral can I ask other question?

As soon as I asked this question, she stood honestly and she was ready to reply my question. So, she was standing on her sitting place and replied her answer in very polite voice.

Nita: Why not sir? Please you can ask me question.

Me: Nita, how many types of quadrilaterals you know?

Nita: Sir in quadrilateral there are rectangle, trapezium, rhombus, parallelogram, kite, square. These are will be in quadrilateral sir.

Me: Oh! You have said. It is correct answer.

In the similar way, I asked other two, three question of rhombus, parallelogram and kite. Whilst I asked these three questions among three students out of two students didn't say correct answer of the question which I asked to them. At that time, I wanted to teach about quadrilateral and I brought all geometrical material in classes which were necessary for that class. I was ready to teach in the class and I had all geometry material for today's class. Thus before starting to teach, I made three groups for them and I provided all materials for each group. These all materials were not difficult to recognize to them because they had already seen around their living society and some materials I used, which one I found with students. After a few minutes they were in each group and they compared each material with the rectangle, parallelogram, and rhombus which was given for today's lesson.

I had seen that all students were busy at that moment, engaging their own group and they started to interact with friends, I knew that they were more passionate to learn about quadrilateral so there in class they didn't feel boring in a group. All were more pleasure to learn given task. Around each and every group I guided to them when they felt difficult and asking question I helped pretty much on better way for them. After discussion in their group once again I explained with material while coming this stage all most students were being confident to elaboration about quadrilateral. Beside this

other they made unambiguous understanding with visualization. For this class, I was at the end but at the same time I heard unexpectedly one question from a group. A from a group asked *"sir why others teacher don't use this type activity with material sir"*? It was not easy question for me but I took a few minutes to think about this question .But I didn't delay to tell this answer I replied *" Ram all school are not able to provide to use this type approach in teaching mathematics and they didn't have more time .* Might be, I came to know that he was not aware with my answer. But almost in the class I got very joyful and very fan tasting environment. All had said in class *"oh! Today we learn quadrilateral and types of quadrilateral with better way"*. When I was coming out of the class I got same voice from the students *"sir thank- you today we are being very happy. I also said "thank you thank you"*.



Regarding above third story, we can understand most of the students they really feel difficulties in geometry rather than other area of mathematics. In mathematics, teachers teach lack of teaching strategies without visualization. Thus they felt more complicated in mathematics .When we used to teach mathematics there all we most of the teachers teach without visualization teaching in class so most of the students feel difficulties to learn in geometry. Moreover we never tried to link with contextualization (Luitel, 2003) of their mathematics problem so they feel very difficult for geometry. If children can bring a lot of local issues of application of mathematics from their household practices to classroom that can help students to understand the value of learning mathematics and also it makes learning mathematics

a fun(as cited in Sharma 2012, UNESCO 2008). Other more as my teaching experiences in teaching geometry, we need to deliverer daily use materials which are available around school or society. Additionally if we use visualization to teach geometry only then students are come to understand more visuals of geometry problem. Throughout geometry materials in teaching geometry it helps to understand more to students and they create new knowledge by doing in a group and materials. Whenever we tried to connection real life problem of students there may help students construct meaningful understanding of mathematics (Poudel, 2010).

Chapter Summary

We know that everywhere students feel more complicate to mathematics in the context of Nepal here. So, all of us are needed to avoid such type of negative belief from the students' and teachers' side. But it is not easy for students and teachers to avoid negative belief and practices immediately. We are not ready for deduce of this negative belief or impact in mathematic. It doesn't promote to learn mathematics in better way. So, all the teachers and students are needed to select possible way to deduce this type of negative belief and practices in teaching mathematics .Then only we will get change in mathematics and all students will be ready to learn mathematics. Especially, wrote three stories based on my past teaching experiences. From this chapter, it makes me clear that teacher's belief and practices are more important for teaching and learning mathematics. Regarding above three stories, they represent my past teaching experiences. At first I had also traditional belief and practices in my teacher life and student life. But when I got this collaborative approach to use in teaching mathematics, I felt extremely good. I got new attitude of student's behaviors and belief in mathematics.

CHAPTER VI

JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: STIRRING FOR/WITH TEACHER EDUCATOR

Chapter Overview

In this chapter, I have tried to represent how I transformed from the school mathematics teachers and students towards novice mathematics teacher trainers as a part of good mathematics trainer to perform with more collaborative approach in training session. When I came at this stage, I tried to bring how I represented my teacher training as far from the teaching students. Moreover, in this chapter I explored my training experiences with specialization area in mathematics by using the collaborative approach successfully. I have developed this chapter with based on my third subsidiary my research question .It was my first event of life I ever conducted the teacher training program before conducted this training program in teaching existence. When I conducted the training program, all trainee teachers also became more excited because my teacher training program was full in activity base all trainee teachers would have got chance any work when they got chance to participate in training session. So, they enjoyed a lot while training conducted was several area. Also when readers or mathematics novice researchers will come in this chapter they will reflect same as their own experiences and without any complicate they can find the how researcher arrive at this moment to conduct research design. Others through this chapter signify researcher was going in transformative to conduct furthers research what result will be appear in others education system of Nepal as far if possible try to research of international system also . Additionally, I have developed this chapter with based on my third subsidiary my research question.

Way forward to teacher educator

As I was in the field of educating students, I began to presume the main goal to be either a teacher or a teacher trainer for my master degree at Sagarmatha University. In that process I entered in education background from my intermediate level to my bachelor level. When I joined my master degree, at first I gave my formal education in one of the biggest and oldest Universities of Nepal which was popular in Nepalese context. Through that way I was coming at the end of my bachelor level but to give continuous my master degree in same university why I didn't conscious. Since I arrived at that moment I heard about one university in Nepal which college had also education faculty with mathematics education which was a little bit far than my previous university. Moreover I heard about the one well recognized university in Nepal where as in that university they focused on practically and all students had got chance to do intern. I was more excited to join that college which I heard at the end of my bachelor degree. Moreover those who joined that university which mainly seeks to enhance a good professional teachers and teacher trainer.

The process of positive impact I decided to join in Sagarmatha University for my master. Therefore, I tried after my bachelor degree for entrance exam all process of Sagarmatha University at last I got chances to join that institution. When I got chance to participate classes of Sagarmatha University, all those classes were really helpful my future career in the field education and teaching profession. Coming to the second semester of my master degree I developed my confidence level rather than my first semester of my master degree.

When I moved to the third semester, I got a lot chance to present in various subject with professional development course of mathematics education. Among those subject somewhat there I got more other which one was core subject three credit hour

course was teachers' professional development in the course of that subject was really helped to my teaching career or related towards my future career. And I got chance to know about various knowledge about teacher training and professional development courses to develop the teachers professionally .But before I got admitted for my master degree in Himalayan University where I was studying my bachelor degree there was also associated with professional development course in education faculty but there just they used theory only and never provided time for practically always they taught in traditional approach and guided by lecture method while teaching.

After when I joined in Sagarmatha University, I started my teaching profession as a career which was well than past teaching experiences and before joined my master degree due to the help of various master degree course of mathematics education in first semester to fourth semester. In this way, I gave with more enthusiastic my study in Sagarmatha university rather than my others bachelor degree and intermediate level. Through more interesting more moments I was appearing in fourth semester at Sagarmatha University. There before completion of master degree those who were going to complete their master degree in that institution they must required doing internship program at the end of master degree. Although I was also appearing fourth semester in master degree of that institution, I got chance to do different types of practical work in internship program with collaborative approach. Everybody of us engaged in a group when we did different practical work where class was conducted with teachers professional development program of mathematics .Moreover, my internship program coordinator gave various ideas about teacher professional development program in mathematics and we also did more practice with different topic in mathematics by using the collaborative approach therefore this was not difficult to conduct the teachers training program for furthers

time. I conducted the teacher training program at an institution. Thus internship program of this institute was aiming to provide the chance to share ideas of learning to the other teacher who are teaching in different schools also trying to be a novice teachers and teacher's trainer. The main purpose of the internship program is to assist private and government school teacher to improve teaching learning activity in mathematics through the several teachers training program.

At Sagarmatha University, the internship program is designed to help the student of this institute to integrate classroom theory with practical work. Students of this institute have studied lots of learning and teaching theories but they are not getting chance to share their ideas about other teacher those who haven't studied in this institution. This internship program intends to use academic knowledge and apply professional skills. Internship programmer is based on the premise that learning in the work world can enhance the learning in the classroom. After completion of our course area related to internship program for teacher training program or workshop program, we were ready to conduct workshop program or teachers training at anywhere.

Therefore all were coming at the end of fourth semester of master degree. When we came to the last semester of this university, we wanted to do teacher training program concerned with teacher professional development area. Hence, I also wanted to do internship program at any institution accordingly to conduct teachers training program. I became fully ready for teacher training program about area in every sector of mathematics or any professional development course. I should conduct teacher training about area in every sector of mathematics education. I was the students of mathematics students. Therefore, my interest was also in specially mathematics. Moreover, I engaged my profession area in teaching mathematics of school level.

Before starting the internship program, I wanted harmonization with any institution because if we do not coordinate with any institution, we cannot succeed to conduct our internship program therefore it was our essential. Moreover, college rule and our requirement were also wanted to do coordination with any institution before conducted teacher training programs. Therefore to conduct teachers training we did coordination with one of the already known organizations and we also coordinated with one institution that institute support to very sympathetic also. So as to institute facilitate to invite different level mathematics teachers and others non mathematics teachers from different schools. Moreover there we were planning to conduct those program activities whereas we coordinated with one of the school at Kathmandu Valley which was going to provide us venue and participants from different schools.

The main rationale of this internship program had to complete 3 credit hour courses with our practical work experiences. The decisive purpose of this training season is to improve teacher's competency by enhancing mathematical content and pedagogical knowledge. Moreover, the main goal of the internship program is to apply the recently practiced pedagogical concepts that we have learned during our study in Sagarmatha University under M. Ed. in mathematics. Through this internship program we were to assist to share and explore the idea of teaching learning mathematics. Whenever we made a plan of internship program, we were form the mathematics education group. Already we had got different group to conduct the internship program. So, in my group also there were four friends. Altogether we were four in each group to conduct a workshop program of mathematics education towards school level mathematics. We were novice mathematics teachers training before conducted that mathematics internship no one of we presented to conduct in teachers trainer. Thus it was great work within our life because of while we be able to

complete this internship program there we will get various opportunity in our life. Form at this way all we were preparing for internship program and already we got fixed venue also. Therefore we didn't have further complicated while we were conducting teacher training program.

When we were in the first day of our teachers training program at that moment all we were being more conscious to our training program because of that type program was doing first time in our student life as well as in teaching profession also. We just began such type of program in our life .Before conducting that training program we never gave that type of teacher training program in any institution but just I got opportunity to participate different type training program related with mathematics subject and others school management sectors also. But after admitted at Sagarmatha University I got chance various type of professional development knowledge to develop our future career. Moreover, when I was in last semester of my study in that institution I got more once core subject towards teachers professional development course. Therefore, in the course of last semester of this subject I got a good confident to start of that first day of teachers training program at that institution where as I gave teachers training program. In first day teachers training program we planned to conduct our training program in order to on proper time in which others program also there requirement through same way we conducted teachers training program. For first day of teachers training program I didn't have plan to conduct teacher training program but where we were starting teachers training program in that institution .I engaged a secondary mathematics teacher and already known environment .So that I needed to perform that teacher training program before started formally because of that institute had already known by me . When I started that teacher training program at that institute I tried to bring in story. It was really more touchable for me because I

never did this type of program and I never lead in this type of program in education field. But here especially I reflected about my leading ability in education how I started.

Beginning Phase of novice trainer

It could be any day of December, 2012. That day I had a plan to conduct of teachers training at any institute of Kathmandu valley. When I made plan conduct teacher training program. At that moment I was being full preparation to conduct teachers training program because of there in our group altogether there we were four members in a group. Moreover, day wise we all friends made plan for teachers training program also in a plan for first day starting ceremony was necessary accomplish by me. Because of when we were starting internship program that institution was proverbial with me and school administration also said to me "you should have to conduct the teachers training program in this school before giving the accept for conducted the teachers training". The purpose of school administration I was ready to conduct the ceremony program. At that institution I was teaching before seven years ago. Before conducting teachers training program already I had schedule how to move program in a precise way for every day. Therefore, for first day especially there I had response to conduct teachers training program where I engaged in a secondary mathematics teacher so that I needed to perform that teacher training program before started that teachers training program than other my friends. Before starting the teacher training program there a little bit I feel uncomfortable .I knew at that moment time was exact at 10: 30 in the morning. When time was exact at 10: 30 I was in the training hall there I had seen different faces of mathematics teachers and school principal because of before starting teacher training program there already I invited to more than fifteen school mathematics teachers and some of school Principal

with formal school letter therefore it was easy to invite them. Moreover, I knew that environment was very quiet there all participants were coming on time and my group friends also there whereas I was going to conduct teacher training program .When I was standing of them in front of that school Principal, other school Principal and mathematics teachers form different level. According to preplan on punctual time, I didn't delay to start the training program so I started that ceremony program of training session .But when I started of teachers training program I was getting a kind of full confident therefore in first to begin that program I didn't feel any complicated . And gradually I was getting more enthusiastic to give continuous of that day teachers training program but for first day I didn't have plane to begin of teaches training program according to our pre planned in first day there my friend had planned to conduct of first day teachers training program .When I started to that training program I got there all trainee teachers and school Principals were being more conscious because of I represented detail about of our four days teacher training package . There in each day program provided in different topic thus they had more expect with that teacher training program. Although already I mentioned there in each day program would be run in different topic. Moreover when I sent letter to them there was also I mentioned though they had shown more passion with that teachers training program because they got pre- information and pre- planned about that teachers training program. By the short introduced I begin training program with occupied confident.

Therefore I didn't feel any complications during program session so program was going ahead and I represented detail about whole training package. After short illustration about training package I moved to take introduction program of participants. But I didn't start direct to take their introduction so. I made plan to change their sit. Whenever I said to them there I saw they felt a little bit

uncomfortable .But I informed" *How I will change your seat let's see you don't feel complicated while I change your seat than previous time"*. I knew that day I got more than fifteen participants presented there so I made all total fifteen lottery number and I informed to them . I said there *"here I made fifteen lotteries number so all you have to this lottery number those who will get 1-5 take group A, 5-10 take group B and 10-15 take group C"*

I informed them about those lotteries I distributed to them. When I distributed those



all lotteries in training session participants were being more interesting. All participants took their lottery number and they took their group according to lotteries number.

Whenever I came at that moment I got very cheerful environment of training

room and all participants they stayed in their own group. Moreover I heard there every group said in their group *"oh! How interesting now it is very funny with us"*, After I made separate group I also felt proud because of their positive thought to make the separate group. Therefore I moved to take the introduction part. When I moved introduction program there I saw all teacher were ready to give their introduction .Therefore I gave authority to start introduction program I said " I requested to them please all of you sir miss madam give your short introduction as well don't forget to say what do you predict through this training program" . When I requested to them all they started to give their introduction turn by turn there in training session moreover I got all participants were being more enthusiastic whenever they said their introduction and about the training program. Introduction program was going on

continuous there one of the secondary math teacher Diwakar sir³² (changed name) was giving his introduction a little bit in different way and he said about program rather than other participants.

" Diwakar sir gave thanks to all our facilitator team and put his perception concerning of whole training program with more interesting way .Sir today I'm being very happy rather than other training program because of I got chance to participate various training program in my life. But there I didn't get whatever you sent to me in letter about training program. Moreover completion through this training program I accept more than that previous training program. Others I will get various pedagogical knowledge, ICT based teaching and other more material development in mathematics of different parts. After completion this training program I will have ability to use different approach in teaching mathematics rather than previous one .when I was teaching by traditional approach in teaching mathematics".

Whenever he said about that day training program with positive consideration I also didn't delay to return the answer I said *" Diwakar sir whatever you have positive thought about the day training program may I do hope while you will complete of whole training program there you will get good pedagogical concept in mathematics .Other you will get chance to develop the several mathematics material by collaborative approach and all you well be able to use this collaborative in teaching*

³² Trainee teacher (Changed Name of person)

mathematics rather than traditional approach. Whatever you used in past time so this program will be more fruitful those who were engaging in teaching".

So I also did not delay to reply Diwakar sir's perception about that teacher training program. I replied there when program was begun by me. On that day program I just required to conduct the training program before started my fellow therefore by the full passion and without any hesitation I endorsed. But other part had necessary to conduct the one of my fellows therefore in training session after a few minutes later .I transformed to my friend to begin that training program therefore programmed was for my friend based on ICT and collaborative and constructivist approach in teaching mathematics .

Over all from the above given episode has represented developed my confidence level and a little bit I was aware to use the collaborative approach in training session as far from the one way lecture method in school level of training session with novice trainer. So, this episode represented key change of my life. It also included the shift I have made in terms of applying collaborative approach in mathematics teaching learning as per the ideals of transformative learning (Pandey, 2010). Moreover, when I started my formal education from class one to university level, coming at that moment. I was trying to amend my traditional approach in teaching also more than other collaborative approach and constructivist approach. Gradually I started to be a novice trainer as far from being school mathematics teacher and presented to in front of various school mathematics teacher .I was successful to conduct beginning session of the teacher training program of beginning session with novice trainer.

Using collaborative approach as Teacher educator

It could be any day of December, 2012. At that moment I was completely engaging in teacher training program in my school. For that day's program wasn't first day so that program was coming third day. That day's program was essential to conduct by me because of whenever we started teachers training program in that school there wasn't sole me. In that institution altogether we were four friends to perform our teacher training program. Although the day before two days ago already two my fellows conducted training program in their relevance area according to our previous planed.

Coming to that day in morning instant I woke in very soon than as usual time since for that day I had a teacher training program where we used continuously for four days .Hence we had a fixed venue according to our pre planned coming at that day we had not more complicated there in training program. Already we prepared for day's teachers training program also. But at that time program was necessary to conducted by me. Therefore I had a kind of fairness nevertheless I never conducted teacher training program before that day .But that I wanted to conduct teachers training program with novice trainer. After few minutes later I avoided my different feeling because of that program was already I conducted first session so. I thought various about that teachers training program in several way.

Because of it was the first juncture I was going to conduct the teacher training program in mathematics for several school of mathematics teachers in different level. Always program started from 10:30 am to 3:30 pm and we had five hours package in one day session therefore for that day I had also five hours teachers training program package. I was fully prepared for my training program from college. When I was in college class through at that time also my program coordinator gave various approaches to conduct the training program without any doubt and with full confident

also we did practice in college .Thus I got confident through practices from college. Furthermore he suggested to me *"While you will start to conduct the teacher training program may there will be appear few problems in training program so that at time you should be careful and you need to handle your program without any hesitation with full confident then only your training program will be success"*. From side of my program coordinator suggestion and my various time practices then only I ready to conduct teacher training program. I entirely prepared teacher training program to conduct in my school with good confident. There already I conducted starting ceremony program. When I woke up in the morning at first I thought about my teachers training program for that day and I started to check all required materials in that day program there my tentative plan ,presentation slides, others materials. Before checking those all materials I prepared that day before so I planned to went very soon in teacher training venue. After a few minutes I changed my dress and I prepared all materials which I had necessary to bring in teachers training program that all kept safely also equipped to take.

That day was at 8:30 am in morning. I left my room and I moved to teacher training venue. When I reached in teachers training program venue there time was around at 9:15 am to manage my teacher training program I reached on time. Where I needed to conduct the teacher training program for third day before I started teacher training program everything I managed there what were to necessary for third day teachers training program .Especially I planned to use through presentation slides with multimedia for few part of the my training program therefore there was also I had preplanned . There everything I managed on time before participants came in training program .I prepared everything what was the required to conduct training program. I took a few minutes rest before begun at 10:30 after few minutes later time I knew time

was exact at 10:30 there all participants were presenting outside of the room which I conducted the teachers training program. Thus I didn't delay to invite present in regular class for all participants I requested to all trainee teachers throughout door I said "*Miss, Madam, sir please everybody come inside*". If I requested to them they also didn't refuse my invitation hence every one of participants came inside of the classroom. Before they entered in classroom I manage everything whatever I had necessary for that day. I prepared projector and laptop with presentation slide and multimedia also.

After I requested everybody, they entered in classroom. They took seat comfortably. I got with participants a little bit different than other days. When all participants took place precisely as well the comfortable participants were ready for that training program. After they took their seat I reflected message on board in front of them on presentation slides. Whenever I reflected that message on board to all participants I got at that moment they concentrated whatever I had showed on presentation slides. They were being a bit conscious to that day teacher training program thus suddenly there in class a few trainee teachers took out their mobile maybe they kept on silence. After I showed that message on board for that day program I distributed to all participants that day my tentative plan. When I distributed that day my tentative plan, I got to know that most of them were busy to watch my plan. They were engaging toward that tentative plan. But I started my formal training program with very confident without any felt introverted also I spread smile on my face. I said " Welcome to all and Good morning; Madam, Miss, sir for today regular our teacher training program. I'm being very glad because of your regular attaining, good cooperation, and valuable suggestion so once more I would like to give many-many thanks for today teacher training program. Especially today's training program

base on materials development in mathematics teaching therefore I requested to present actively in your group moreover today you will have group work in your group you need to show your good performance in group and today you will get a little bit difficult than others day because of you need to participate actively for to fulfill of today's goal". I gave short prologue about that day program after completion of my short prologue I got all participants they were being more enthusiasm due to their smiling face and they showed their passion. I already had started that day's program formally to conduct the teacher training program I divided the program into three sessions for each session had time bound. I did not delay to misuse time. Therefore, I followed session wise of the training program. At first I embraced the first session of my teacher training program intended for first session time that was 10:30 to 11:15 in which I needed to complete my first session training program because of time bound schedule. In first session at first I had a short introduction about training program as well as me therefore I gave my short introduction and that day training program. After I completed short prologue about as myself and that day training program there in training classroom there at first I used to arrange group of all participants .Thus I requested to all participants to transform their sit than previous if I requested to all participants to change their sit they were also agree .

But I already planned to change their seats when I planned to change their sit at that day's also more than fourteen participants were presenting. To change their seats directly I didn't call their name but suddenly I planned by the others at first I nominated up to four number therefore I started from first to four again I repeated from one to four in that way I completed their nomination . Then I said "Please you should have to make four group and need to stay those who were appearing for one those person need to stay in one others also sit in this way ".When I divided them into

four group there some of participants said to me suddenly in class "oh! How is interesting you are dividing group" maybe they liked group arrangement also. After divided into four groups I had given away a one promotional teacher professional development video for ten minutes. While they got chance to watch that video in teachers training program during at that moment all they concentrated to video whatever I showed a motivational video about teacher's professional development. I also concentrated through that promotional video actually at that moment they enjoyed behind of the few minutes later that video I raised few question to all participants when I asked question about that video there all were more excitement to reply my question answer .But I gave volunteer to share their view about that video therefore one participant she was being more excitement thus I gave opportunity to her I knew that she was teaching in lower secondary level around the Kathmandu valley of one reputed school . After she got opportunity to share about that first my warm up video if she said about that video I finalized she was really got more knowledge through that video. When she completed her perception about that teacher promotional video and I gave opportunity to other few participants. All they were being happy with my first warm up then I moved to second my warp up program for first session of teachers training program. In second warm up program also more related with mathematics there I gave some kind of geometrical figure also then I provided few minutes to instruction about that figure.

Through used that figure at first they had time to divide into three parts after they required to join all those three pieces to get shape of square. While they were busy they divided into three parts at that moment they got mystification behind they were busy for divided which figure I provided to them. For a few minutes later on they came to know that figure to divide into three parts. But all they were success in

the direction of given task other they had difficult task which was by the help of three different size of figure required to make a square. They tried on various time to get a square against they gave continuous but suddenly at that time one of teachers he got success through arranged things among those three types of different type of figure he got a square .When he was successful to get a square I requested to help his friends too in the group. He was also more excited to help his friends in a group so that he helped in precise way to all groups. After I completed those two different types of warm up activities I moved to next area which was given in mine tentative plan. That time was to prologue about purpose of the first session program as well as others whole program of my teachers training program. I spent time for a few minutes to prologue about objective of first session program also whole program my teachers training. I had a time bound. Therefore I didn't delay to introduce about program objectives. Especially at that moment I was in first session teacher training program therefore I moved to relevant area of that session .For that session I required to provide the knowledge in detail to derive the formula in algebra of $(a+b)^2$. Before proving that formula I used other different activities too. Then only I moved to derive that formula in details. In training session at first I requested to discuss their lived experiences in teaching and learning phase to relevance area within group. The entire trainee participant's they were in a group when I requested them afterward they started to discussion in each group of their lived experiences. Furthermore In this session participants were asked to reflect back to their student's life experiences in this algebraic expression to derive that formula. How they learned the concept of that formula to develop in algebra. Also I requested to all Participants write down their past experiences key in points through the student's life then individually shared their experience in a group. When they discussed their lived experiences I was in the last

session of first session of teachers training program. Therefore at the end of last session from each group I selected one volunteer to share their idea to consequence area how they discussed in group. To share their idea to others group there one volunteer had selected therefore who had selected volunteer to share their lived experiences to other group whatever they discussed in a group. When they came to that moment, that was very interesting in each I also surprised whatever they shared their lived experiences to relevant areas. I got every participants had unique to learning and teaching phase of that algebra to derive formula. At that time session was full of excitement; all participants taught and learned in not new approach. However I planned to deliver too moreover suddenly I felt for second session would be extremely excited rather than first session. All groups they shared their lived experiences within time because of time bound when they completed shared own experiences. I also shared my lived experience in teaching and learning of that formula. Whenever I shared my experience to relevance area most of my experiences also analogous to their experience a little bit different than their experiences but a few things were fascinating than theirs. Which one was fascinating in my life whereas I was studying and teaching that also I shared at that moment they felt suppressed also they started laugh with more excitement. After completion this type of activity then I had provided to participations break time for ten minutes their refreshment. After break time all participants they entered in again their regular classroom then I started second session of teachers training program for second session time had started from at 11:25 in second session training program there participants needed to engage in a group to develop teaching materials to consequence area .

Through active participants in a group they could be proficient to develop teaching materials which was specified in the plan. When I came at this moment I got

participants were being more deliberated to develop the teaching materials in algebra of $(a+b)^2$. All the way through their active participants I was also being more excitement to deliver my plan to all trainee teachers. Although I started to complete of the second session of my teachers training program before started to develop the teaching materials in training class. I manage everything whatever I required toward whole program so that I didn't have any difficulty to perform my teachers training program. I had three types of colors charts papers at first I provided those all papers of blue colors papers and Scissors to all participants at that instant they were ready so that I gave instruction by the help of those you need take out two different measured square. Then again I distributed to them red types of charts papers I said "From those types of red papers you needed to take out two rectangles which have length and breadth by the help of same measured from square there they took out two different types of square. All they were successes at this stance to take out rectangle and square of geometrical figure. Thus, I requested to arrange among those different two figure what you could be prepare until all they were not success they tried to arrange different types of figure but at the end of they were proficient to prepare a square through all combination of among four figure. Everybody had four figure again I distributed white chart papers and I said to arrange within white charts papers. In that way we I visualized in precise way after derived the formula of algebra everybody they got surprised. Some of the participants said in the class " we never learned in this way from this type of formula we can visualized other geometric figure and we are able construct also this is more efficiency in the mathematics class". Arrived at the end of the second session of training program I was being quite being happy rather than first session of my teacher training program because I got active participants of trainee teacher some of the participants gave positive suggestion of second session of

teachers training program . As entire of second session program was being effective and we spent few to discuss all over the second session of my teacher training program. After the completion of second session of training program, they had twenty minutes break time therefore all participants moved towards outside for lunch. When they returned again after their break time, there once more I welcomed to all participants for third session. Especially the third session of my training program started from at 1:30 in that session also conducted in more collaborative approach to develop the teaching material of mensuration, a geometry part. In the last session novice teacher had got chance to develop the teaching material through papers folding and papers cutting to find the area of angle of triangle, parallelogram, rectangle, and trapezium by paper folding and paper cutting. Then there terminated activity where I intended to collect some written text form of responses of the trainees. At last, module was wrapped up with response journal that included comments note, feedback of participants of this module to anticipate trainees concerns and it's important in the present context of Nepali Mathematics Teaching and Learning. In third session such type of activity can be conducted such as Short introduction, again Arranging group, A warm-up promotion video of teacher professional development and other related with geometrical figure, Introduction and objective of this training program , in brief discussion about their teaching/learning lived experiences to relevant topic in geometric and mensuration, in brief sharing on ways of how they were facing teaching/ learning mathematics to relevant area , to share their idea to others group there one volunteer would be selected therefore leader would share idea to other group whatever they discussed in a group. When they shared their perspective in other group, they were ready to develop the teaching material of cube and cube from different way. Especially at that moment participants would had opportunity to

develop the cube from two different ways to develop teaching material in mensuration part .To develop teaching material all participators in training session they would be full engaged in group to develop of teaching materials'.

After they developed the teaching materials of mensuration in mathematics I had provided time to discussion on group whatever they made in the class. Furthermore all participants try to linkage to relevance area throughout whatever they would prepare teaching materials in training session. Whenever they completed those all thing for that day training session at last they had a time to write their reflection of whole program. Coming at this moment I expected with them their critical comment throughout my entire program and all participators were provided with ten minutes to write their own experiences throughout as my facilitating during the teachers training program. When I was conducted this program during last session, my teachers training program all participants without any hesitation they reflected their own experiences throughout a whole training session.

In this episode, I tried to represent more about collaborative approach in teaching/learning as thus far from the school level of students. When reader come to know at this chapter of this episode really from this episode shows researcher has changed in transformative way than traditional approach. Moreover, this episode has key changes too. As I shared my experiences, the lives of those above reading story can possibly connect their lives to my experiences and undergo a transformative moment (Stinson, 2009). I knew that I was really successful to conduct teaching training program by using collaborative approach. This episode helped me to develop as transformative researcher and critically examine my values and beliefs; examine how our life worlds have been govern (Sharma, 2012) . It will help me to change my

deep negative belief, value, system, and rule in teaching/learning mathematics in the context of Nepal.

I have completed teacher training program .After completion of teachers training program gradually I got changed my career also .When I taught in a school there at first I was just a single school teacher only without any other post such as respective post of school administration. When I successfully conducted teachers training in my school there all of them school administration became more happy with me because of I delivered the very positive message to others school and school teachers. Thus school administration knew that when I did teachers training program at that institution, that program was more beneficial to the school and those who were participating in training program. Moreover at first school principal was not ready to provide of training venue for teachers training program. I knew that he had doubt with me and whenever I purposed conducting teacher training program. At first he was not ready to provide me but whenever I convinced more about that teacher training program. At the end of time he was ready for teachers training program venue whereas I was teaching. After agreed of his authority for training venue of training program I got chance to conduct teachers training program very successfully. Whilst I completion teachers training program there I got all good positive response around of that school and that school Principal Sir also being more happy due to the my progression of leading ability and I delivered some new teaching approaches in teaching mathematics in the direction of the others school mathematics teachers . I was successful novice mathematics trainer there that my school Principal said to me"

Sir at first I had doubt with you I don't have any hope may you couldn't complete this teachers training program with successful but whatever I thought in previous time that is failure sir currently due to your good

command leading ability of training program . You gave more other teaching learning approaches in mathematics. So others school teachers also have to say me your good positive thought about teachers training program. Moreover I was very happy to your good progression of development in profession. Although from this year our school administration also decided to take as a post of training coordinator. Therefore now I request to sir please take as this post training coordinator of this school, may I do hope you can do better and you can create high-quality educational environment rather than past time.

He has requested with me to take that post I also did not delay to reply his requested because of I was more excitement to do something better in my profession. I replied very positive perspective with more excitement to take as training coordinator in a school due to I showed my positive response. I had appointed as a school training coordinator so I planned several training programmed and school management program.

Whenever I was successfully conducted teachers training program and appointed in a school training program coordinator. I planned myself; I knew that when I had conducted teachers training program at that moment those who were participating in training every teacher gave very positive perception about that training program. Moreover I got everybody were more excitement in the training program but I thought that wasn't enough for me. Therefore I wasn't being ware for whenever I conducted teachers training program. Moreover after a few months later I planned to interact with them those who were participating in my teachers training program. Therefore I went to meet with some of the school mathematics teacher those who have presented in training program

Chapter Summary

In this chapter; given all story has portrayed being as a teacher educator in daily practice of collaborative approach. It has given more unambiguous successful and changing teacher educator through using collaborative approach in daily learning practices as far from the previous teacher centric approach. Moreover, when researcher (me) came at this stage all given episodes has guided by Habermasian theory of emancipatory .Though I have located myself as emancipatory teacher educator /learner in this research study because the emancipatory interest meant to me that "independent from all that is outside the individual ' and is a state of autonomy rather than libertinism (Grundy, 1987, p.16 as cited in Shrestha, 2011).

CHAPTER VII

JOURNEY FROM TRADITIONAL TO COLLABORATIVE TEACHING: MY LEARNING AND REFLECTION DURING RESEARCH WRITING PROCESS

Chapter Overview

In the journey of my research project, I have presented my reflection in several forms. I have reflected my experiences as a student, a teacher, and a mathematics educator. When I have come to this chapter, this chapter is the sum total of the image of my inquiry. When I came on this stage I have presented all events of my life. How I became a learner and how I taught my students being a novice teacher in teaching/learning mathematics and why I, as a researcher, have selected the research topic within this collaborative approach in teaching learning mathematics. So, in this chapter I have provided the entire body of my research project in brief.

Training program from the eye of a teacher educator

It could be any day of July, 2013. Overall, the above episodes represented I came to know that, maybe it would be last episodes for my research project. So when I came at this moment I was being a little bit being happy due to the progression of my teaching career. Moreover, I developed my leading ability and used different approach in teaching and learning activities in mathematics. After completion of teacher training programs of all trainee teachers they were not in contact with me. I also didn't try to meet with them. But after a few months later I planned to meet for the some of the participated trainee teacher there how they spent their life in teaching profession and if they had changed teaching approach or not . I thought such way so I went to meet for some the trainee teachers to take their view about my teachers training program. When I didn't take their positive or negative view of training

program my research project didn't get any shape and research project tend to without any direction.

Therefore, I wanted give right direction my research project and whilst I came at this stage data required to give more authentic and all readers they feel more reliable with researcher. Furthermore wanted to give how researcher tried to bring his authentic data from research project. Though to give direction of my research project I came to decide for taking their perception of training program.

It was any day of July; at that day weekend of my country so if I made plan to meet. That day all trainee teachers were ready and they were more excitement to share about their progression of profession. After training program whatever they did how they got in teaching profession due to my earlier plan. I went to one school when I reached that school there one trainee teacher was ready to meet with me. I Planned meet with that trainee teacher. Trainee teacher was secondary math teacher at any school .When I reached at school there I saw the previous trainee teacher with good smile on his face. I also replied with my smile face, I said "*Rajendra sir Namaste! How are you?*" and Ram sir also didn't delay to reply. So, Rajendra sir said to me "*Sir Namaste hai still I'm very fine and going very well ahead of my teaching profession*".

I came to know that environment was very peace at that moment so we had time freely share our view with each other there was no any disturbance of surrounding of school environment. Whenever we meet at a school Rajendra sir requested me to stay his office room so both of we went to his office room. In office room we took sit and we were there face to face. After we took sit on sofa set Rajendra sir (changed name) ordered two cup of tea from his canteen room. Whenever he ordered tea then we started to share our view with each other. I said to Rajendra sir "*After a long time we are getting chance to meet now how is going these*

days sir. I planned to meet from previous time but I didn't success. But just we are successful anyway I'm very happy Sir ". While I said to Rajendra sir there I knew he was being more excitement and he said " me also very happy sir after a long time we have got chance to meet on today so I do have time easily share my experiences and after when I came from that training what happened in my life . All things to share today I have time sir but how to start sir those all my happiness". When I saw his more positive excitement there I was being more hurry to hear his view so I also didn't delay. Directly I entered whatever was necessary for that day I made plan after meeting to all trainee participants. I said Rajendra sir "Rajendra Sir how did you feel that day our training program and other had you any planed to change your teaching approaches in mathematics after you return in school". Rajendra sir said,

I'm being very happy. Before I had presented that day program I taught many more years from primary level to secondary level mathematics teacher and I was teaching in various school as a part time teacher .But I never got chance to know and learn such a that day training program sir .Moreover really you have changed my teaching style and behaviors also . Sir Maybe you are also mathematics teacher so every mathematics teachers in Nepal we used our lecture method and we never try to visualization of our mathematics with our culture. Therefore, our students feel very complicate in mathematics Sir. But sir you have shaped to me in other direction of my future career sir. At first I want to give thank to you Subash sir for changing my future carreer. Still I never forget that day's training program in my life. I tried to implement in my teaching mathematics class whatever you delivered in training session.

Furthermore you had said about that collaborative approach in teaching mathematics classroom that was also more beneficial. Sir really you provided very beneficial approach in teaching mathematics. Subash sir today I will share freely my excitement

of after that training program whatever I did and whatever I have got result after use of different approach in teaching as far from the my traditional approach .Now already I have changed my teaching approaches before I have participated that teacher training program . I was very traditional type of teacher I never tried to use other different approach as far from the traditional approach. But Sir when I returned from that day training program really I have tried to use in teaching mathematics so I have got different changes and all of the students are being very happy due to the use of " collaborative approach in teaching mathematics". Moreover, I have focused on students centre teaching approach though now all students are being very happy with learn mathematics sir. Furthermore other one thing sir when I have started to use collaborative approach and use of visualization in teaching mathematics there. Students have appeared in one terminal examination I have got very good result sir rather than past time. Although still I'm feeling very enjoy in my teaching and easy also sir.

He shared about his progression in profession I also very happy because of a little bit I was successful to change negative perception about teaching approach and mathematics subject of Nepali mathematics teacher in Nepal. I have said after when he shared about his occurrence in teaching career other progression of students' achievement.

I replied with him, "*Rajendra sir I'm not expert but whatever I have learned from my experiences that I have shared in training session .But that wasn't enough I have other things also so when we will have time again we will be there. If all past trainee teachers are ready to participate there again I will invite them and we will share how to go ahead in teaching profession. Rajendra sir we want to change our negative belief and perspective about in teaching mathematics If we well start really we can*

bring change in mathematics teaching .Moreover we will be success to remove of students negative thought "mathematics is very hard subject " they feel easy and enjoy in mathematics whenever we are successful to use collaborative approach in teaching mathematics. Other from the different mathematics lab work students feels easy and they will be pleasure in mathematics. So Rajendra sir let's start together.

Rajendra sir also agrees with whatever I shared about mathematics teaching approaches and several type of lab work in mathematics. When we were coming at that time I knew time was being more than an hour. So I have requested with to go out from that school because for that same I have planned to meet other trainee teacher who has appeared in training program.

In the above episode; story has represented I do hope it gives more authenticity of my research project. When researcher came at this moment researcher tried to show more reliable. Moreover, I knew that when I came at this juncture developed my all things to teaching learning activities. At first before starting my master degree I was just teacher traditional type of teacher only but gradually a little bit I was successful a novice mathematics trainer. When I started my teaching career in education field there I wasn't aware of contextualization (Luitel, 2003) of mathematics in my teaching practices. But from my master degree, I got chance to practices in cultural mathematics as far being as a novice trainer. I developed to novice trainee teachers an impression that teachers were of contextualization of mathematics in their teaching practices which I have depict as a novice teacher trainer through workshop (Shrestha, 2012).

Moreover, in this episode I have portrayed here being as a successful novice teacher educator. After being successful novice trainer there I developed how a

teacher can link the culturally decontextualize (Luitel, 2003) mathematics to the culture of their students and encourage them for learning mathematics (Shrestha, 2012). So the main purpose of culturally relevant pedagogy is to empower students to critique society and seek changes based on their reflective analysis (Ladson-Billings, 1992, p. 26, as cited in Sharma, 2012).

Final Reflection

I have reflected of education project my education journey being as a students, teacher and teacher educator with using an autoethnography inquiry ,writing which provokes the reader to reflect , provides self narratives about the power of reflection and introspection in examining an changing my practices (Stison, 2009). Before I have joined my master degree I was highly advocating of traditional approach in teaching/learning mathematics. So, I have used my teaching learning practices in traditional approach. But whenever I have joined my master degree there I came to know about the different approach than traditional approach which has known as collaboration approach .Whenever I have got advantageous and significance of collaboration approach in teaching learning mathematics at that juncture I was highly motivated to use this collaboration approach in my teaching learning field. So the grand interested of this collaboration approach I have tried to use for few months my teaching learning phase after applied of the collaboration approach in my teaching learning field. I have got very affirmative result than before I have applied this collaboration approach. Therefore getting affirmative result of collaboration approach in teaching learning mathematics I have planned to conduct research within this area. After doing various struggles at last I came to decide to conduct my research project of collaboration approach in teaching learning of mathematics. Thus from this study has given that the importance collaborative approach in teaching learning of

mathematics is more beneficial in Nepal. Where Nepali mathematics teacher have not been able to use this collaborative approach in teaching learning mathematics they highly advocated with traditional approach(teacher center method) in teaching/ learning mathematics. Additionally, from this research project has shown to be a more vivid tool for students learning achievement in mathematics. As the result of this research and my experience, I have tried my best to make my classroom in teaching learning mathematics more enthusiastic. I have got more in teaching learning mathematics there is not a single way .When we can use several approaches in the classroom students also feel more enthusiastic to learn in mathematics. Moreover, I have learned always we have respect the students leaning interest and ability towards learning. Finally I would like to summarize my research project belongings: me myself, student, teacher and educator. “How did I practice my mathematics teaching/learning in the classroom? How should I practice my teaching and learning mathematics in future? Which pedagogy(s) and paradigm(s) should I follow in my future research study? How should I be guided by any philosophy to deepen my knowledge in mathematics (Shrestha, 2011)?

Letter for All Mathematics Teachers

Dear All,

Mathematics teachers, I want to convey important message to you all. I have spent more than fifteen years mathematics student, teacher and teacher educator. I was teaching mathematics in different level such as primary to secondary level. As my lived experience always I was advocating with traditional approach in teaching learning mathematics before I have learned about collaborative teaching approach. Even most of mathematics teachers were as far from this collaborative approach in teaching learning activities. Traditional practices of teaching learning in mathematics

gave more anxiety, frustration, hesitation to students for giving continuous better learning in mathematics. As the result of those traditional practices I realized to change our traditional practices in teaching learning mathematics. I have successfully applied collaboration approach in teaching learning activities as I was being teacher and teacher educator. After used the collaborative approach I have got change the students' perception, attitude, towards in learning mathematics. All of they shared mathematics subject was not hard moreover, they visualized their mathematics curriculum with contextualized .So at the end of this letter I would to like to request all Mathematics teacher .It might be helpful to we all practicing , if we care about child psychology their interest, ability than we may get the experiences of meaningful mathematics teaching learning process .If we teach through collaborative it may n any subject develop strength of knowledge through child friendly environment. .Furthermore, they don't feel terrified with mathematics teacher. Though at last not least please everybody we mathematics teachers try to use this collaborative approach for better learning in mathematics.

Subash Karki

Mathematics Teacher, Teacher educator and

Mathematics Researcher.

My Future research direction and possibility

When I came at this moment of my research project, after articulating based on my own several stories and experiences (Pandey, 2010), I spent various critical movements in my life. Sometimes, I got a lot of frustration and confusion when I conducted my research project. But I never had to look back in course of my research project because of regular support and guidance of my respected Guru ³³(Dr.

³³ Teacher.

Bal Sir) who helped me to shape my research project. Moreover, whenever I met Dr. Bal Chandra Luitel, he offered me positive suggestions, commenting on my strength and weakness in my research project. Ultimately, I came at the end of my research project because of his inspiration and good suggestion. During my research, I have got to know about several pedagogical practices of teaching and learning of mathematics. I saw and found that mathematics classroom culture relied on very traditional approach in Nepal. Most of mathematics teachers are unaware of the collaborative approach in teaching learning mathematics. In the early stage of my teaching profession, I used the same teacher centre approach because I didn't know any other method of teaching mathematics. I had used the same approach whatever most of the school mathematics teachers used to teaching strategy in teaching mathematics. I was highly advocated of that teacher center method in teaching mathematic moreover I had a negative perception about mathematics teachers that I thought mathematics teachers as a superior person than other teachers so we are higher level. Developing that type of negative perception I didn't try to search other approaches in teaching/learning mathematics. But when I got chance to know about the collaboration approach in teaching learning and used my teaching learning field. Thus I have changed my direction of teaching strategy than previous type of teaching learning in mathematics. When I have changed my direction Although based on my research project may it has shown that all trainee teachers, novice teacher and trained teachers .I came to know that in the context of Nepal many more of the teachers are far from the collaborative approach or students center in teaching/learning mathematics than one way lecture method . Moreover, those who were participating in teacher training program there all trainee teachers; I have founded that the large gap between different strategies used in classroom teaching and method of collaborative

approach of mathematics. Arriving at the end of my research project through based upon my research in this stage moreover I came to know that as a critical teacher researcher. I will try to develop conceptual and collaborative approach of mathematics teaching process in my class.

Moreover from at this time I will try to articulate as a part of my reflective journey of mathematics teacher, students and a novice researcher.

Furthermore, coming at this stage of my educative journey and my research project, I have experienced substantial changes in my thinking, viewing, receiving and behaving including my

teaching and learning (Khatri, 2012). So from this my research project will be helpful for me used effective strategies as from the lecture method and other teacher centre approach in teaching mathematics in mathematics classroom. I came to know that in my research project more here my research project is determined to explore more in the field of various nature and forms of decontextualize (Luitel, 2003) mathematics. To do so, as cited in Shrestha (2011), I agree with D'Amboriso (2002) that now the time has come to do some creative work for people associated with mathematics and creative practices of mathematics in the social and cultural contexts. Overall my research project has portrayed itself as a pathfinder, which uses various forms of collaborative approach in teaching mathematics in the classroom teaching and

Direction for my path

I will be a teacher;
Who can here students' sounds
Who can learn with them
Who can be a part of each group?
Who can be a facilitator for everyone
and for every work?

I will be a teacher researcher;
Who can be a reflective practitioner
himself first
Who can seek for searching
alternatives rather than solutions
Who can be a part of the research

I will be an educator;
Who can make curriculum for a child
Who can bring soul in mathematics
Who can educate for life
Who can educate educator to be a
learner before educator
Who can take child as a real educator!
As cited in (Neupane, 2012)

learning. Additionally, I wanted to change in our society the practices of teaching method and classroom culture and give rise to the collaborative approach in our society through journal, paper writing in the capacity of a math teacher and teacher educator. So after this research project, I will try to be a change agent for our society.

REFERENCES

- Belbase, S. (2006). *My journey of learning and teaching mathematics from traditionalism to constructivism: A portrayal of pedagogical metamorphosis* (Unpublished dissertation). Kathmandu University, Lalitpur.
- Belbase, S. (2013). Images, anxieties, and attitudes towards mathematics. *International Journal of Education in Mathematics, Science and Technology*, 1(4), 230-237.
- Brookfield, S. D. (2005). *The power of critical theory for adult learning and teaching*. England: open University press. Retrieved from www.openup.co.uk
- Bullough, R., & Pinnegar, S. (2001). Guidelines for quality autobiographical forms of self-study research. *Educational Research*, 30(3), 13-21.
- Burrell, G. and Morgan, G. (1979). *Sociological paradigms and organizational analysis*. Cambridge University Press, Cambridge.
- Clarke, D. (1997). The changing role of the mathematics teacher. *Journal for Research in Mathematics Education*, 28(3), 278-308.
- Cohen, L., Manion, L., & Morrison, K. (2007). *Research methods in education*. London: Sage.
- Cohen, Manion & Morrison. (2002). *Research methods in education* (5th ed.). London and New York: Routledge and Falmer.
- Cole, A.L. & Knowles, J.G. (2008). *Arts-informed research*. Handbook of art in *Constructivism: A portrayal of pedagogical metamorphosis*.
- Cranton, P. (2000). Individual differences and transformative learning. In J. Mezirow and Associates (eds.), *Learning as transformation*. San Francisco, CA: Jossey-Bass.

- Cranton, P. (2006). *Understanding and promoting transformative learning* (2nd ed.). San Francisco, CA: Jossey-Bass.
- Creswell, J. W. (2003). *Research design: Qualitative, quantitative and mixed methods*. *Cultural Studies of Science Education* 2(3), 621-638.
- D'Ambrosio, U. (1985). Ethnomathematics and its place in the history and pedagogy of mathematics. *Journal for the Learning of Mathematics*, 5(1), 44-48.
- D'Ambrosio, U. (1990). *Etnomatematica [Ethnomathematics]*. Sao Paulo: Editora Atica.
- D'Ambrosio, U. (1998). *Ethnomathematics: The art or technique of explaining and knowing* (P. B. Scott, Trans.). Las Cruces: ISGEm. (Original work published in 1990).
- Dahal, N. (2013). *Teacher- Students relationship and its potential impact on mathematics learning: An autoethnography inquiry* (Unpublished master's dissertation). Kathmandu University, Nepal.
- Denzin, N.K. (1997). *Interpretive ethnography: Ethnographic practices for the 21st century*. Thousand Oaks: Sage.
- Dewey, J. (2001). *Democracy and education*. The Pennsylvania State University.
- Dillenbourg, P., Baker, M., Blaye, A., & O'Malley, C. (1996). The evolution of research on collaborative learning. In E. Spada & P. Reiman (Eds.), *Learning in humans and machine: Towards an interdisciplinary learning science* (pp. 189-211). Oxford: Elsevier.
- Dillenbourg, P., Baker, M., Blaye, A., & O'Malley, C. (1996). The evolution of research on collaborative learning. In E. Spada & P. Reiman (Eds.), *Learning in humans and machine*: Ellis, C. & Bochner, A. P. (1996). *Composing ethnography*. London: Sage.

- Ellis, C. & Bochner, A. P. (1996). *Composing ethnography*. London: Sage.
- Ellis, C. & Bochner, A. P. (2000). Autoethnography, personal narrative, reflexivity. In N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 733- 768). Thousand Oaks: Sage.
- Ernest, P. (1991). *The philosophy of mathematics education*. New York, NY: Falmer Press.
- Ernest, P. (1994). *What is social constructivism in the psychology of mathematics education*. Lisbon: University of Lisbon.
- Ernest, P. (2004). *The philosophy of mathematics education*. Taylor & Francis Group.
- Ernest, P. (2005). *Constructing mathematical knowledge: Epistemology and mathematics education*. Washington, D.C.: The Falmer Press.
- Gautam, S. (2011). *“Literacy sucks!” Lived experience of Tharu women* (Unpublished MPhil Dissertation). Kathmandu University, Nepal.
- Glaserfeld, E.V. (1983). *Learning as a constructive activity, in Bergeron and Herscovics*, (Vol. 1, pp. 41–69).
- Guba, E. G., & Lincoln, Y. S. (1989). *Fourth generation evaluation*. Newbury Park, London.
- Guba, E.G., & Lincoln, Y.S. (2005). *Paradigmatic controversies, contradictions, and emerging confluences*. In N.K.Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research* (3rd ed). Thousand Oaks, CA: Sage.
- Habermas, J. (1971) *Towards a Rational Society*, London, Heinemann
- Habermas, J. (1972) *Knowledge and Human Interests* (2nd ed.). London, Heinemann
- Habermas, J. (1972) *Theory and Practice* (2nd ed). London, Heinemann
- Jaworski, B. (1994). *Investigating mathematics teaching: A constructivist enquiry*.

- Jaworski, B. (1998). Mathematics teacher research: Process, practice and the development of teaching. *Journal of Mathematics Teacher Education*, 1(3), 31. Kluwer academic.
- Johnson, D.W., & Johnson, H. (1989). *Leading the cooperative school*. Edina, MN: Interaction Book Company.
- Johnson, D.W., & Johnson, R.T. (1989). *Cooperation and competition: Theory and research*. Edina, MN: Interaction Book Company.
- Khatri, K. (2012). *Aiming to take a shift: A journey from T/HERE* (Unpublished master's dissertation). Kathmandu University, Nepal.
- Kincheloe, J. L. (2003). Critical ontology: vision of selfhood and curriculum. *Journal of Curriculum Theorizing*, 19(1), 47-64.
- Kincheloe, J. L. (2008). *Knowledge and critical pedagogy: An introduction*. Springer Science + Business Media B.V. Canada.
- Kincheloe, J. L. (2009). *Teacher as researchers: Qualitative Inquiry as a path to empowerment*. London: The falmer press.
- Kincheloe, J. L. (2010). *Knowledge and critical pedagogy*. Dodrecht, the Netherlands: Springer.
- Lakatos, I. (1976). *Proofs and refutations, the logic of mathematical discovery*. M.A
- Lamichhane, S. P. & Wagle, M. P. (2008). Post- modernism and Nepal's education. *Journal of Education and Research*, 1, 9-12. London: The Falmer Press.
- Luitel, B. C. (2009). *Culture, worldview and transformative philosophy of mathematics education in Nepal: A cultural-philosophical inquiry* (An unpublished PhD thesis). Curtin University of Technology.

- Luitel, B. C. (2012). *Mathematics education research as/for teacher professional development: Transforming the heart, mind and soul of mathematics Education*. 12th International Congress on Mathematics Education, Seoul.
- Luitel, B. C. and Taylor, P. C. (2006). Envisioning transition towards a critical mathematics education: A Nepali educator's autoethnographic perspective. In J. Earnest and D. Treagust (eds.), Rotterdam, the Netherlands: Sense.
- Luitel, B. C., & Taylor, P. C. (2006). Envisioning transition towards a critical mathematics education: A Nepali educator's autoethnographic perspective. In J. Earnest & D. F. Treagust (Eds.), *Educational change and reconstruction in societies in transition: International perspectives* (pp. 91-110). Rotterdam, the Netherlands: Sense.
- Luitel, B. C., & Taylor, P. C. (2007). The shanai, the pseudosphere and other imaginings: Envisioning culturally contextualized mathematics education. *Cultural Studies of Science Education* 2(3), 621-638.
- Luitel, B. C.; Taylor, P. C. & Mphil Student of KU. (2012). *Mathematics education research as/for teacher professional development: transforming the heart, mind and soul of mathematics education* (Unpublished paper). ICME, Korea.
- Luitel, B.C, & Taylor, P.C. (2005), *Overcoming culturally dislocated curricula in a transitional society: An autoethnographic journey towards pragmatic wisdom*. Perth: Black Swan.
- Luitel, B.C. & Taylor, P. C. (2007). Envisioning transition towards transformative Mathematics education: A Nepali educator's autoethnographic perspective. Perth: Black Swan.

- Luitel, B.C. (2003). *Narrative explorations of Nepali mathematics curriculum landscapes: An Epic Journey* (MS Dissertation). Curtin University of Technology
- Luitel, B.C. (2003). Narrative explorations of Nepali mathematics curriculum landscapes:
- Luitel, B.C. (2012). Mathematics as an Im/Pure Knowledge system: Symbiosis, (W) holism and synergy in Mathematics Education.
- Marcus, G. E. (1994). *Handbook of qualitative research*. London: International Educational and Professional Publisher.
- Mazirow, J. (1997). *Transformative learning: Theory to practice. new direction for adult and continuing education*, (pp.5-12). San Francisco, CA: Jossey Bass.
- McNiff, S. (2008). Art-based research. In Knowles, J.G. & Cole, A. L. *Handbook of art in qualitative research: Perspectives, Methodologies, Examples, and Issues*. London: Sage.
- McRobie, C. (2009). *International handbook of science education*. Dordrecht: Sage.
- Mezirow, J. (2000). Learning to think like an adult: Core concepts of transformation theory. N. K. Denzin & Y. S. Lincoln (Eds.), *Handbook of qualitative research* (pp. 733).
- Nelson, C. E. (1994). Critical thinking and collaborative learning. *New directions for teaching and learning*, (59), 45–58.
- Neupane, R. (2012). *A Journey from euclidanism to posteEuclidanism* (Unpublished master's dissertation). Kathmandu University.
- P. C. (Ed.), (2006). *Contemporary qualitative research: Exemplars for Science and mathematics educators*. Netherlands: Kluwer Academic Publishers.

- Pandey, T. (2010). *Teaching mathematics: A shift in terms of applying participatory pedagogies* (Unpublished masters' dissertation). Kathmandu University.
- Paudel, K. P. (2008). *Tharu culture: An ethnographical prospective* (Unpublished masters' dissertation). Kathmandu University, Nepal.
- Pokhrel, T. R. (2006). *Cooperative learning in mathematics: Practice in Nepalese classroom context*. Kathmandu University, Nepal.
- Poudyal, A. (2010). *Exploring mathematics in motherly nature: An autoethnographic inquiry* (Unpublished masters' dissertation). Kathmandu University, School of Education, Lalitpur.
- Richardson, L. (1995; 2000). *Writing: A method of inquiry*. In N.K. Denzin & Y.S. Lincoln (Eds.), *Handbook of qualitative research* (3rd ed., pp. 959-978). London: Sage. Routledge Farmer.
- Richardson, V. (1997). *Constructivist teacher education: Building new understandings*. London, UK: Taylor & Francis Inc.
- Schubert, W.H. (1986). *Curriculum: Perspective, paradigm and possibility*. New York, NY: Macmillan Publishing.
- Sharma, T. (2012). *Becoming a "good" mathematics teacher: An epic journey through different mathematical terrains* (Unpublished masters' thesis). Kathmandu University, Nepal.
- Shrestha, I. (2011). *My journey of learning and teaching: A trans/formative from culturally decontextualize to contextualized mathematics education* (Unpublished masters' thesis). Kathmandu University, Nepal.
- Smith, J. (1961). *The American educator encyclopedia*. New York, NY: The United Educators Publishing Co. Inc. Springer

- Smitherman, S. (2006): *Reflections on teaching a mathematics education course* (PhD Dissertation). Louisiana State University.
- Stison, A.B. (2009), *An Autoethnography: A mathematics teacher's journey of Identity cons construction and change.* (Middle-Secondary Education and Instructional Technology Dissertations). Georgia State University,
- Taylor, P. C. (2007). *Contemporary qualitative research: Exemplars for science and mathematics educators*. Perth: Curtin University of Technology.
- Taylor, P. C., Settellmaier, E., & Luitel, B. C. (2009). *Multi-paradigmatic transformative research as/for teacher education: An integral perspective*. In Tobin, K., Fraser, B., & McRobie, C. (2009). *International handbook of science education*. Dordrecht, Netherlands: Springer.
- Taylor, P.C. (2012). Transformative research for meaning centered professional development. *Meaning centered education: International perspectives and explorations in higher education*. Dordrecht, Netherlands: Springer.
- Toumasis, C. (1997). The NCTM standards and its philosophy of mathematics. *Studies in Philosophy and Education*, 16, 317– 330.
- Upadhyaya, H. P. (2008). *New trends in mathematics education* (Unpublished masters' thesis). Kathmandu: Vidyarthi Prakashan
- Van Manen, M. (1990). *Researching lived experience*. NY: State University of New York Press
- Van Manen, M. (1991). *The tact of teaching: The meaning of pedagogical thoughtfulness*. NY: State University of New York Press.
- Van Zoest, L. R., Lo, J. J & Kartky J. L (Eds). (2012). Proceeding of the 34th annual meeting of the *North American chapter of the international group for the psychology education*. Kalamazoo, MI: Western Michaignan University.

Vygotsky, L.S. (1978). *Mind in society: The development of higher psychological processes*. Cambridge, MA: Harvard University Press.

Vygotsky, L.S. (1978). *Mind in Society: The development of higher psychological processes*.

Wilber, K. (1995). *Sex, ecology, spirituality: The spirit of evolution*. Boston: Shambhala.

Willis, J. (2007). *Foundations of qualitative research: Interpretive and critical approaches*. Thousand Oaks, CA: Sage.