

**CHALLENGES OF MATHEMATICS TEACHERS IN TEACHING
CULTURALLY DIVERSE CLASSROOM**

**A
THESIS
BY
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Letter of Approval

This thesis entitled “**Challenges of mathematics teachers in teaching culturally diverse classroom**” submitted by **Mr. Ganesh Pokharel** to partial fulfillment of the requirement for the degree of master of Education has been approved.

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.....
Prof. Dr. Bed Raj Acharya

Supervisor

Date: 24 Feb., 2023

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Dedication

Honestly dedicated

To

My parents

Declaration

This thesis contains no material that has been submitted for the award of another degree in any institution. To the best of my knowledge and belief, this thesis contains no previously published materials by any authors, unless due acknowledgment has been made.

.....

Ganesh Pokharel

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.....

Ganesh Pokharel

Abstract

The present study entitled **“Challenges of mathematics teachers in teaching culturally diverse classroom”** has main objectives to identify the challenges faced by mathematics teachers in culturally diverse classroom and to explore the ways to address the challenges they use to deal with them. The design of this study was qualitative with an ethnography approach. The data were collected by using semi-structured interview guideline and classroom observation form. The total sample were four mathematics teachers from primary level of Rupandehi district. I adopted non-random convenience sampling procedures. I analyzed and interpreted the collected data from descriptive point of view.

It was found that mathematics teacher have faced different challenges in culturally diverse classroom and they are: lack of student active participants in learning mathematics, use the medium of instruction, mixed ability class, lack of teacher skill in information communication and technology (ICT) and individual awareness and discipline of students. To address this challenges teacher need to use some effective strategies like use of mixed language as medium of instruction, teach with well-planned lesson, create student centered environment, use of information communication and technology, develop rapport, use teaching learning materials, implementation of collaborative learning and using culturally relevant pedagogy for mathematics teaching.

Finally, this study suggested that teacher service Commission (TSC)needs to the recommendation by the checking about teacher and students language/ culture status. Moreover, this study suggested implication related to pedagogical and policy. Provence/Local level can conduct training about teacher language and other related culture problem by the collaboration with belongs to school.

Table of Content

<i>Letter of Certificate</i>	<i>i</i>
<i>Letter of Approval</i>	<i>ii</i>
<i>Copyright</i>	<i>iv</i>
<i>Dedication</i>	<i>v</i>
<i>Declaration</i>	<i>vi</i>
<i>Acknowledgement</i>	<i>vii</i>
<i>Abstract</i>	<i>viii</i>
<i>Table of Content</i>	<i>ix</i>
<i>LIST OF SYMBOLS AND ABBREVIATION</i>	<i>xiii</i>

Chapters

I : Introduction	1
Background of the Study	1
Statement of the Problem.....	3
Objectives of the Study	3
Research Questions	4
Rational of the Study	4
Delimitation of the Study	5
Definition of Key Words	5

	x
II : Review of Related Literature	8
Empirical Literature	8
Research Gap	13
Theoretical Literature Review	13
Ogbu Cultural Difference and Discontinuity Theory	14
Vygotsky Constructivism Theory of Social Development	15
Conceptual Framework	16
III : Method and Procedures	18
Design of the Study	18
Area of Study	19
Selection of Participants	19
Data Collection Tools	20
In-Depth Interview	20
Classroom Observation	21
Data Collection Procedure	21
Data Analysis Procedure	22
Quality Standards	23
IV : Analysis and Interpretation	26
Section I: Challenges of Mathematics Teachers in Teaching Culturally	

	xi
Diverse Classroom	26
Diversity in Classroom but Uniformity in Teaching.....	27
Lack of Students Active Participation in Teaching Learning	29
Challenges about Mixed Ability Class	31
Lack of Teacher's Skill in ICT	33
Challenges about Student-Centered Environment	35
 Section II: Ways to Overcome the Challenges in Culturally Diverse	
Mathematics Classroom.....	36
Use of Mother Tongue as a Medium of Instruction	36
Teach with Well Planned Lesson	38
Create Student Centered Environment	39
Use of Teaching Materials	41
Use of Information and Communication Technology (ICT)	42
Develop Rapport	44
Using Culturally Relevant Pedagogy for Mathematics Teaching	46
V: Findings, Conclusion and Implications	48
Findings	48
Findings Related with Challenges	48
Ways to Address the Challenges of Related Findings	50
Conclusion.....	51

Implication

Pedagogical Implications52

Implications for Policy52

Reference

Appendices

List of Symbols and Abbreviation

T.U. : Tribhuvan University

B.S. : Bikram Sambat

M.Ed. : Master of Education

B.Ed. : Bachelor of Education

E.g. : Example

HSEB : Higher Secondary Education Board

IT : Information Technology

MOE : Ministry of Education

NESP : National Education System Plan

No. : Number

Chapter I

Introduction

This research focus on challenges of Mathematics teacher in teaching culturally diverse classroom. The first chapter of this study is introduction. This chapter presents the background of the study, statement of the problem, objective of the study, rationale of the study, delimitation of the study and definition of key term use in my research.

Background of the Study

Nepalese society is diverse from multicultural, multilingual, multi-religious. There are different cultural background students are present in mathematics classroom. Culture is continually being socially constructed, and because individual identities are constructed through the intersection of racial, ethnic, class, gender and other experiences, it can't be reduced to static characteristics of or essences (Acharya, 2013). Since school culture reflects the values, beliefs and tradition of the school community delineation. In classroom there are students from culturally diverse, social diverse and cognitive diverse. Integration of multicultural education in mathematics mean the use of daily life examples, familiar metaphors and personal perspectives from diverse frames when examining mathematical concepts, formulas, theorem and even thing paradigms (Acharya & Rai, 2020)

“Being a good teacher is a lot like being a good gardener” (Elona Hartjes).

Which compare teachers with gardener? Good gardeners are able to see the potential in those struggling young seedlings and enjoy watching them grow, develop and bloom. Same like teachers have responsibility to make bright future of children. Teachers had the responsibility as the bridge in educational, intellectual, logical and good behavior development of a child.

According to psychologist Vygotsky learning is influenced by the culture and also language of community. “The home is the child’s first school, the parent is the child’s first teacher, and reading is the child’s first subject” (Barbara Bush, 1925). Language spoken at home is the first language learnt by the child. The critical period hypothesis holds that first language acquisition must occur before cerebral lateralization is complete, at about the age of puberty. One prediction of this hypothesis is that second language acquisition was be relatively fast, successful, and qualitatively similar to first language only if it occurs before the age of puberty (C.E. Snow and all, 1978). We can predict that before the age of puberty, child focus on learning language. By this way child gets the problem to learn other academic skill. Child is admitted to learning institution at around the age of 4 years (Education Policy, 2076).

When teacher and students are from different communities, speaking different language and showing different culture activities is detrimental of effective learning. In Nepal there are 123 languages and 125 cast (census, 2068). But Report submitted by the Language committee to the government in 2076 submitted 129 languages spoken in Nepal.

Words; phrases; symbols; abbreviations; ways of speaking, reading, writing, and arguing of mathematics helps to acquire fluency in learning mathematics. Learning becomes more fruitful if we deliver mathematical skill at first language at the primary level. Most research on mathematics education in bi/multilingual classrooms has urged for the use of the learner’s home language(s) as resources for learning and teaching mathematics. International congress on Mathematics Education raise the issues and problems as effect of Multicultural and multilingual as mathematics education (ICMI, 1984, Canada).

Statement of the Problem

Issue of cultural diversity in mathematics education is one of the major issues in the context of Nepal. In the Nepal's Constitution report 2072 Section 31(5) it has mention that ‘‘Every Nepali community has a right to receive education in their mother tongue in accordance with the law and to open and operate schools and educational institutions for that purpose’’. At primary level, Nepali is compulsory and the mother tongue of the student concerned was to be the medium of instruction. The policy of multilingual education was approved and implemented since 2064 with the aim of facilitating students' access to learning in their mother tongue. Any of the proposed laws was not to be enforced by public policy.

According to news published on Kantipur Daily on 2079 Shrawan 11, for previous 5 years student's mathematics scores are found to be dropping every year. The students in the classroom are culturally, socially, and cognitively diverse. If teachers and students from different communities which is the problem of teaching. Students present different activity, teaching in a second language are a huge challenge for teacher. The teacher service commission allocates different reservation quotas and sends teachers from one community to teach in another community in different parts of the country which hinders effective teaching. If the language and culture of the teacher and the student is different, teaching is ineffective. So, exploring the related problems, finding and their better solutions was my choice of interest.

Objectives of the Study

1. To explore the challenges of mathematics teacher in teaching culturally diverse classroom

2. To explore the ways to address the challenges in teaching culturally diverse classroom

Research Questions

1. What challenge face by teachers while teaching mathematics in culturally diverse classroom?
2. What strategies do teachers should adopt to improve teaching mathematics in culturally diverse classroom?

Rational of the Study

Teacher faces the problem related to multicultural, multilingual, student psychology, teaching method etc. Teacher has faced classroom base and non-class-based problem. Classroom are common ground for all languages, gender, religions, cultures and casts. The classroom environment should be helpful for learning process of each and every child. Non-Nepali language students also can get quality education at primary level if available multilingual teacher and mother tongue curriculum (Tamang, 2003). One of the main challenges to mathematics teacher is culturally diverse classroom. Therefore, teachers should be aware about background of students then they can be effective learning. In short, the rational of this study as follows:

-) It is contributing to find out the challenges faced by the teacher in teaching mathematics at culturally diverse classroom,
-) Mathematics teachers become benefit from this finding to selection the effective teaching strategies for motivate the students in learning mathematics,
-) I hope that these finding is also beneficial to mathematics

teachers, and students itself,

-) This study is helpful the parents to create learning environment to their children,
-) The findings is also data bank for reference and helps for further educational research.

Delimitation of the Study

Delimitation is the process which a researcher determines the scope of his study area and what kind of tools he wants to study based on the available resources and time. This study was delimited as follows:

-) This study delimited in 2 school of Rupandehi district.
-) This study focused only mathematics teacher who teach in class 2 and 3 of Rupandehi district.
-) This study was delimited on 2 school in which frequently teacher transfer by governmental origination from other community.
-) This research based on the responses of mathematics teacher, students and educated people of the society.
-) This study based on qualitative analysis.

Definition of Key Words

Diverse classroom. Here diverse refer to student's home background they are from culturally diverse, social diverse and cognitive diverse. Diversity is the concept of diversity and includes people from different social and ethnic backgrounds, different languages, genders, physical abilities, religions, beliefs, political beliefs, sexual orientations, technical ideas, etc.

Multilingual classroom. Here, multilingual classroom refers to such a classes

of Rupendehi district Kanchan Ruler Municipality where students are from different language background such as Nepali, Bhojpuri and Tharu.

Challenges. Here challenges refers to an objections which are faced by MLT teacher while teaching in Culturally diverse classroom.

Strategies. Here strategies refers to art of planning and ways used by Mathematics teacher to tackle the challenges and to achieve success especially in Culturally diverse classroom.

Mother tongue. Here mother tongue refer to the student's first languages/home language e.g. Nepali, Bhojpuri, Tharu etc.

School culture. Culture include the beliefs, customs and social behavior of a particular people or society. School culture represents the values, beliefs and traditions that define the school community and the relationships between students, parents and teachers.

Mathematics teacher. Those who are formally involved in the teaching of mathematics, especially at Primary level.

Learning problem. Learning is the process of acquiring, modifying or reinforcing new knowledge, behaviors, skills, values or preferences and can involve integrating different types of information. When teacher and students are from different communities, speaking different language and showing different culture activities is the issue of learning problem.

Home environment. In this study, the factors affecting the home environment of students learning mathematics at home are parental qualifications, economic level and gender discrimination. It turned out to be a family factor. This is an important factor directly related to student learning.

Improve. Improvement refers to motivating and encouraging students to learn mathematics by reducing their negative views on math. Factors such as student interest, self-confidence, background knowledge and anxiety reduction have been shown to influence mathematics learning.

Chapter II

Review of Related Literature

The review of related literature is systematic identification and analysis of documents containing information related to research problems (Niure, 2018). In my experience, literature review is a comprehensive summary of previous research on a topic. In my research, the main purpose of literature review is to study about what research has been done in multilingual mathematics classroom and what research has not been done in teacher related issues about multilingual classroom. In addition, the purpose of literature review is to cite previous research related to multilingual mathematics classroom and teacher absence in my study, to study about different research which are related to students' difficulties in learning mathematics, to identify inconsistencies gaps in research, to identify methodological techniques for research and at last analysis & interpret the data by using theoretical and conceptual framework.

Empirical Literature

Adhikari (2006) carried out the study entitled " Cultural discontinuity and learning difficulties in mathematics: A case study of primary Dalit School children". The objectives of the study were to identify the cause of difficulties in learning mathematics of Dalit children at school, to identify the impact of the home environment of the Dalit children to learn mathematics at school. She raised the research question: How do Dalit children feel difficulties to learn mathematics at school? Does student's behavior influence Dalit children at schools? Participant observation, in-depth interviews were used for data collection. He found that the caste system has an influence on the daily life of the people. Their way of talking and behaving

to other people, their relation, experience and perception toward other things and other people. It is the caste system that determines people's everyday lives and their occupations. Similarly, children adopt different learning strategies. Home environment and cultural discontinuity were the main causes of learning difficulties for Dalit children in the classroom.

Poudel (2019) did a study on "Strategies used by mathematics teacher to promote social justice in mathematics classroom". The main objectives of this research were to explore the strategies used by mathematics teacher to promote the social justice in mathematics classroom and to explore the challenges of the teachers in maintaining social justice in mathematics classroom. Classroom observation, focus group discussion and interview guidelines were the main tools of the study conducted in Kritipur, Kathmandu. Researcher found that the main challenges faced by mathematics teacher in maintaining social justice in mathematics classroom were: different mental abilities of students, different family background of students, lack of interaction, unable to teach according to student's mother tongue or lack of multilingual teachers and unable to choose appropriate teaching method.

Bhandari (2015) did a study on "Problems of classroom management in learning mathematics". The objective of the study was to identify the problems of classroom management in learning mathematics and to analyze the problems related to classroom management. This research was a survey type conducted in Chitwan district. Researcher found that most of the teachers were not using appropriate teaching methods as well as concrete materials in mathematics teaching. Suggestion of the study is that teachers should understand the psychology of the

students encourage and motivate a student teaching mathematics.

Pandey (2019) did a study “Exploring learning environment in mathematics classroom” in two secondary level schools at Bardiya district. Objective of the study was to explore learning environment in mathematics classroom at high result achiever and low result achiever schools. This research design was descriptive and qualitative in nature. Finding of this study is high result achiever school Mathematics classroom has good and child friendly environment for student and in low result achiever school physical environment of mathematics classroom has not well and child friendly for student. Suggestion of this study is innovative workshop training should be provided and modern techniques technology and method which are learned by teacher on training should be properly used while teaching in classroom.

Multilingual education means usages of two or more languages in teaching process. In the context of effective teaching process mother tongue is considered as the strong foundation followed by national language and English. Also, it helps in use of these languages for developing beneficial skills for lifelong learning. (Malon, 2005)

Among the 7 aims to be achieved by Education for all National Action plan 2001-2015, the 7th point states, “Ensuring the right of the ethnic and linguistic minorities in the country to receive basic and primary education through their mother tongue. The National Action Plan for Education for All, the 15th Plan and the School Sector Development Program have also set out strategies to encourage mother tongue education programs to increase the involvement of different ethnic language groups in education.

According to Paudel (2006), “The Effect of Mother Tongue on

Children's Classroom Learning" explores the effects of mother tongue on classroom interaction, the impact of mother tongue on learning interaction. The study was based on survey design in 4 schools of Syangja district. In which the problems related to the learning interaction of the Magar children, the problem of understanding, the main problem related to the sound pronunciation and learning stability and pronunciation were seen. To overcome this, teachers need to be multilingual trained, have patience and develop a Magar language textbook.

Setati, (2005) did a study on "Teaching Mathematics in a Primary Multilingual Classroom". The article argues for the need to recognize and acknowledge the political role of language when conducting research into the relationship between language and mathematics education in multilingual classroom. This article specifically focuses on one Grade 4 lesson in South Africa. It suggested that teachers in multilingual classrooms pay attention to how the different languages present in their classrooms can be used to support learner's participation in a range of mathematics Discourses.

Air (2018) did a study on "Difficulties in learning mathematics of Raute children" The objective of this study was to explore the causes of difficulties of Raute children in learning mathematics at primary level. In this research data were collected through the in-depth interview and class observation at 4 Raute students. From this research it is concluded that language discontinuity at home and school was definitely affect the quality learning of the student. The researcher of this research suggest that culture enroll teacher who know about the Raute language.

Sah (2008), "Effectiveness of the mother tongue in teaching mathematics

at primary level'. The objective of the study was to explore and compare the mathematics achievement of the students at primary level taught by their mother tongue as first language and Nepali as second language was taken to fulfill the nature of the study. The study is experimental type research based on one school of Siraha district. Finding of the study on achievement test was that the students taught by mother tongue in mathematics performed better than the students taught by Nepali language. It is suggested that similar studies should be carried in other parts of the country in a larger scale on mathematics as well as other subjects and language.

Tamang (2003) did a study on "The State of Tamang Mother Tongue Teaching". Objective of the study was in Class 1 attempted to find out the number of Tamang children who could not speak Nepali and the problems related to classroom operation. The study was conducted using mixed method in two schools of Nuwakot district. In which it is said that depriving children of the light of education due to language is a violation of their rights. The conclusion is that the mother tongue education program is in crisis due to the attraction of other languages and the neglect of the responsible bodies. Therefore, it is suggested that the policy implementation level and research level should be consciously responsible.

At conclusion review articles argue for the need to recognize and acknowledge the political role of language. The main problem related to the sound pronunciation and learning stability and pronunciation were seen with Magar community. Many articles objective focus on to explore the causes of difficulties of different cast children in learning mathematics at primary level. From this research it is concluded that language discontinuity at home and school was definitely affect the quality learning of the student.

The researcher of this research suggest that culture enroll a teacher who know about the multi-language. At last finding of the given review study on achievement test was that the students taught by mother tongue in mathematics performed better than the students taught by Nepali language. It is suggested that similar studies should be carried in other parts of the country in a larger scale on mathematics as well as other subjects and language.

Research Gap

The challenges faced by maths teachers in teaching culturally diverse classroom is an area that has received increasing attention from researchers. I have studied some related theses, which focus on monolingual (Tharu, Magar, Tamang...etc), on how monolingual affects students' learning, some studies have also focused on teachers' linguistic problems. However, little research has been done on the difficulties encountered by the teacher in teaching culturally diverse class.

Although some studies have focused on the challenges of teaching maths in culturally diverse classrooms, there is a need for more research on effective teaching strategies and pedagogies that can help teacher overcome these challenges. There is need for more in depth exploration of how maths teachers can effectively teach students from diverse culturally backgrounds.

In my studies, I focus on the sector of culturally diverse classroom like; classroom management, teaching method and materials, use of ICT etc. I raise these issues to explore the reality of the primary level mathematics learning condition. Teachers and students of the different communities are the learning problem.

Theoretical Literature Review

Theoretical literature provides the researcher with theoretical knowledge and a

philosophical basis for research. Any type of research is developed on atheoretical basis. Hence, I have used various theories to bring out the theoretical generalization of social realities from my disparate nature of interviews and observational data. There are various theories such as the Ogbu theory of cultural differences and discontinuity, the Vygotsky theory of constructivism on social development.

Ogbu Cultural Difference and Discontinuity Theory

Ogbu (2000) described about the cultural difference and discontinuity theory. Also highlighted the problem in children's learning caused by the difference and discontinuity between the culture at home and school. It addresses children's learning problems caused by cultural differences and discontinuities, and those much smaller in school culture can easily address systems that can lead to better learning outcomes. He said that children who come from similar home cultures to the school culture was be able to face well with the new educational system, which could lead to better learning outcomes. At the meantime, children that experience a distinct cultural environment at home and at school don't focus as much on their studies. Compared to the students with good matching, they have to work harder to fulfill learning goals.

According to Ogbu (2001), learning is an outcome of cultural and linguistic diversity, but it's also important to consider the nature of the relationship between minority, underprivileged, and dominant groups, cultures and languages because these groups have control over the educational system through the implementation of their curricula and the exclusive use of those languages for instruction. Ogbu (2000) explained that home culture and school environment have incomparable effects on cultural learning in school. And it reflects the values of the belief and traditions of the school community

and defines the relationship between students, parents and teachers. It can be observed that there is a link between social culture and the school culture which in fact further characterized by the local culture.

Vygotsky Constructivism Theory of Social Development

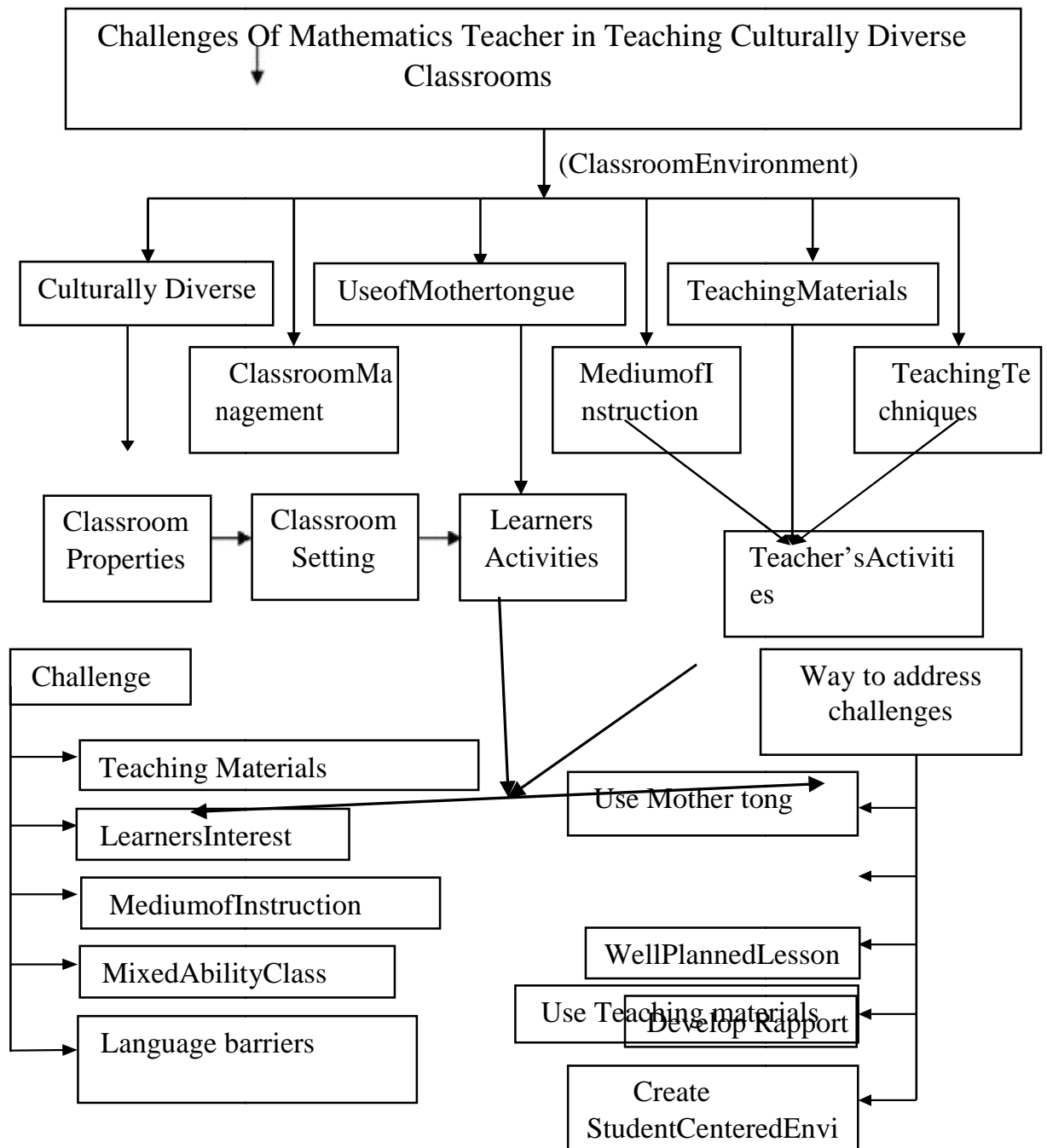
Social constructivism is a type of constructivism developed by Lev Vygotsky that emphasizes society and bases its theory on the social content of learning. Social constructionism is based on social phenomena. People obtain knowledge through the experience of their social functioning, which they receive from their adult environment of functioning.

According to Vygotsky (1986), learners first create knowledge in their interactions with people and functional contexts. From this perspective, knowledge and learning are seen as social activities mediated by artifacts and cultural resources. In the Vygotsky theory, the teacher can guide the students in dealing with the problem, encourage them to work in groups to think about the questions, support them with encouragement and advice. Vygotsky (1978) suggests that cognitive development occurs first at the social level and then at the individual level. By understanding others and building knowledge at this social level, students can empathize with the situation. This means that knowledge is present in society. First the children deal with their social environment, then he learns himself based on his own environment. And it has a special meaning for things. Therefore, a society that includes the adult environment, language and other customs is a permanent source of knowledge for children. Likewise, mathematical knowledge deduces from social and adult practices.

Conceptual Framework

Conceptual framework is a mental map or framework. It is the presentation of the understanding of theories and his/her concept to the relationship between different variables. I have applied Ogbu and Vygotsky theory. The conceptual framework of my study of my study is as follow:

Figure 2.1 Conceptual framework



Challenges of mathematics teacher at culturally diverse classroom is one of the emerged contemporized issues. So, I apply a qualitative research design with an ethnography approach for doing this research. Classrooms are full of different cultures, different economic backgrounds, and genders.

Moreover, there are many social factors that affect the learning process. So there was applied the cultural reproduction theory. There was semi-structured interviews, classroom discussions, observation in the classroom to collect the data. The collected data was coded, categorized and thematized to analyze and interpret of collected data in this study.

Chapter III

Method and Procedures

It is an important aspect of research work. Authenticity and reliability of any research depends upon the tools and methods which are used for data collection. This chapter describes how the study was conducted to full fill the objective of the study. Methodology deals with the research design, population and sample, data collection tools, reliability and validity of tools data collection process, data analysis, and interpretation process.

Design of the Study

The research design is qualitative with an ethnography approach. The qualitative design is descriptive and exploratory in nature (Acharya, 2015). The qualitative research approach helps to discover the individual views for data collection such as group discussions, individual interviews and participation of others (Carol, 2016). It is difficult for measuring and calculate the numerical value of students' difficulties in learning mathematics from quantitative approach, therefore I was used to be qualitative research Design with ethnography approach.

Research designs are plans and procedures for research that span the decisions from broad assumptions to detailed methods of data collection and analysis (Cresswell, 2009). Qualitative research is a generic term for various research tracks that study phenomena in their natural environments, without a predetermined hypothesis. Qualitative research design has various characteristics, such as naturalistic research, context-specific, human as an instrument, emerging design, inductive analysis, descriptive data, personal contact and insight, unique case orientation, empathic

neutrality and dynamic systems. There is various qualitative research, such as study cases, ethnic magazines, stories, phenomenology and land with land (Khanal, 2073). I want to gain concrete, contextual, in-depth knowledge about a specific real-world subject. The major concern of my study is to find out the perception of teacher about which factors are affected in teaching mathematics at culturally diverse classroom. So, for achieving this purpose I use ethnography research design because in ethnography design data is collected through by direct observation in natural setting and the actual incident on the spot. Here, case is the process of selecting a limited number of teacher & doing research on teacher and then collecting data from him/her.

Area of Study

For the purpose of the study, I have chosen the two public schools in Rupandehi district. Because there are students from different cultural backgrounds coming to study. Study area selection is a very important task for the study in order to obtain easy access taking information and gathering data directly related to the research objective. In the small area, multi-cultural groups are living there such as Nepali, Bhojpuri, Tharu etc.

Selection of Participants

Sample size of qualitative research is not fixing. There are no rules for sample size in qualitative inquiry. Therefore, the sample size of this study depends upon the researcher what he wants to know, what the purpose of the research was, what can be credibility of the study, I select Gautam Buddha Basic School, Rupandehi and Gajedi Secondary School, Rupandehi (based on my convenience) was selected as a source of primary data. And also, I select 2/2 mathematics teachers from both school which I have

chosen for my research. This is a qualitative research design. I have used purposive sampling for choosing the participant.

Data Collection Tools

Research tools are the basic instruments to collect data to find out the possible solutions for observed problems. In this study, I wanted to find practices, challenges of Mathematics teacher at culturally diverse classroom. In order to the mentioned research questions, the tools of the study were participant observation and in-depth interview guidelines which are described below.

In-Depth Interview

The interview is a two-way interaction between researcher and participants in the form of interviewer and interviewee in which the interviewer creates situations that can attract the attention of respondents for a long enough period of time in asking questions and answering the questions which interviewee puts her understanding and meaning. In this study, all the required information didn't possible to gather through the observation and documents. To go in-depth of the information I had carried out the open-ended interview along with unstructured and structured questions as well as observation. I have taken in-depth interviews of my participants' teachers using unstructured interview guidelines for giving the information for managing the learning problems and overcoming the difficulties.

An interview is a mutual exchange between a researcher and a participant. The interviewer creates a situation where the interviewee can hold the interviewee's attention long enough while he asks and answers questions that convey his understanding and meaning. Notes and documents alone cannot gather all the information needed for this

study. Dig deeper into the information you provided for the public interview, along with unstructured and structured questions and notes.

To provide insight into how to cope with learning difficulties and overcome difficulties, we conducted in-depth interviews with participants' teachers using unstructured interview guidelines.

Classroom Observation

In qualitative research, observation is most frequently the method of choice of behavior modification studies that frequently use single subject research designs. Observation is most often used in small sampled subjects, which may be participant and non-participant. Participant observation is that in which the observer is familiar and participate with the subject of the study. To get the required information I have observed school overall as well as key respondents individually and collectively during their work at school, classroom, playing with peers interacting with teachers, school and home behavior, family background, culture, participation, etc. In classroom observation, I tried to find out why the students feel difficulties.

Data Collection Procedure

Data collection is an important part of the study. On the basis of the data, we can study and analyze every aspect of the study. For this study, the data and information have been collected by using tools as participant observation, in-depth interview. The data from interviews consists of direct questions to people about their experiences, opinions, feelings and knowledge. The data from observation consist of the detailed description of people's activities, behavior, actions and the full range of interpersonal interactions and

organizational processes of observational process, human experiences. In my research, I have collected the information through taking their in-depth interview with teachers and students.

As a field study, I visited two schools in the Rupandehi district dated 2079/9/01. Firstly, I met with two teachers from both schools. Before conducting the interview I had taken the consent from the participants by clarifying the objectives of this study. I had used semi-structured interviews of four teachers from the selected schools. In this study, the face-to-face semi-structured interview was used as a research tool as it is useful for obtaining first-hand data which are more reliable and authentic. Then the interview was conducted based on some guiding questions for the exploration of the current implementation and issues related to the multilingual classroom. I observe mathematics culturally diverse classroom only by taking the permission with head-teacher and also mathematics teacher of related school. I used primary sources and secondary sources for data collection process. The primary information collected from mathematics teacher, mathematics students and as well as from educated people of the society. The participants expressed their views, ideas, thoughts, and experience regarding the implementation and issues of the culturally diverse classroom is based on my questions. While taking an interview with them I recorded their interview and noted important points given by them. And secondary information collected from books, article, reports, news papers and soon. After collecting the data, I have done interpret and analyze the data then the finding and conclusion be drawn.

Data Analysis Procedure

The analysis and interpretation of the collected data is an important part of the

research work. Richards (2003) argues that analysis is neither a separate stage nor a separate process. It is something somehow during the research process.

After collecting data or information from the field, I tried to triangulate it on a theoretical basis. I also embedded key theories into the data and mapped their main themes. From the theoretical point of view of managing the received information, I evaluated the subject and created clear ways to solve the problems.

This study is limited on qualitative research approach therefore the major part of data analysis was based on descriptive analysis. According to Niure (2018) "After collecting the data, the collected data can be analyzed on the basis of Organizing the data, Editing the data, Coding and Recoding the data, building theme, Reporting and Finding procedure". Similarly, I follow this above procedure. First of all, I have organized and edited the collected information from interview and classroom observation then I generated the difference code according to the response of participants. I gathered/adjusted those codes according to their similarities and I gave the theme. At last, I have analyzed and interpreted those themes by using the theories.

Quality Standards

After completing the construction of the research tools, it is necessary to maintain quality standard. For maintain quality, following parameters were considered. Gubba (1985) proposed four criteria for 'Naturalistic' research. As their work to 'formalize rigor' has been particularly influential in social science generally, and in the occupational therapy field specifically, it is worth focusing on their categories in some depth. Interestingly, they link their criteria with four terms used in below.

Credibility. This concept replaces the idea of internal validity, by which

researchers seek to establish confidence in the 'truth' of their findings. Lincoln and Gubba (1988) recommended several techniques inquirers may use to enhance the credibility of their research: prolonged engagement, persistent observation, and triangulation, peer debriefing, negative case analysis, progressive subjectivity checks and member checking, and Peer review in the field.

Triangulation of data means the collection of data through the multiple sources to include interview, and document analysis (Cresswell, 2009). In this study, I was use multiple of data to confirm emerging findings. Also, I used multiple stand point to analyze the collected data using reviewed literature,

The member checking ensures the truth value of data (Cresswell, 2009). In this study, I performed the member check by sending participants a copy of their views. The next method that I used to increase the truth worthiness is the prolonged engagement in the field. To maintain credibility of the research, I tried to spend as much as time for observation and engaging with participants with their work. After getting information, I wrote notes, asked similar types of question to others people and tried to find real practices, challenges of semesters system in mathematics education from that information Contexts or settings (where the interpretations might be transferred). To maintain transferability, I explained practices in the particular community briefly. I tried to capture most of scenario by using thick description of observations, interviews and then making meaning in the research (Acharya, 2017).

Dependability. This concept replaces the idea of reliability i.e. the issue of dependability refers to the idea of another researcher being able to repeat same work, in

the same context, with the same methods and participants, and get similar results. This is the second standard for judging qualitative studies and refers to the stability or consistency of the inquiry processes used over time. To maintain it, I collected document all processes in detail, and then I shared with advisors to get in evaluation to help the process to conform dependability (Acharya, 2017).

Ethical Considerations. Ethical consideration is one of the most important parts of the research. Without ethical consideration, research can't be fruitful. The major ethical consideration in the study is the permission of school administration, information to the students while taking an observation of the classroom, interview. There won't be any discrimination due to gender, casts, and cultural diversities while collecting the data. For maintaining the ethical issues of my research. I was be informed consent to my participant, secrete the privacy of my participant, cited the authors whose ideas were taken in my research, and are aware of the plagiarism.

Chapter IV

Analysis and Interpretation

This chapter mainly focuses on the analysis and interpretation of the collected data. It addresses two research questions: what challenges do teachers face while teaching mathematics in culturally diverse classrooms, and what strategies should teachers adopt to improve learning in such classrooms?

Qualitative information was collected systematically to answer these questions related to teaching-learning strategies and classroom discourse of culturally diverse students. The analyzed data were interpreted using different theoretical perspectives discussed in the literature review section.

The chapter is organized into two sections. Section I discusses the challenges faced by teachers when teaching mathematics in culturally diverse classrooms, Section II discusses the strategies that mathematics teachers can adopt to overcome these difficulties. The study aimed to interpret the challenges and strategies related to classroom teaching-learning activities and students' participation and teacher performance. To achieve this, the researcher conducted classroom observations and interviews with four mathematics teachers, two from different communities (T1 and T2) and two from the same community (T3 and T4). The recorded data were transcribed, translated, and coded into different themes. The collected data were analyzed and interpreted under two different sub-topics.

Section I: Challenges of Mathematics Teachers in Teaching Culturally Diverse Classroom

This sentence refers to a specific section of the chapter that focuses on the

challenges faced by mathematics teachers when teaching in culturally diverse classrooms. The section examines these challenges in detail, and the data collected on this topic are analyzed and interpreted thematically and logically. This means that the researcher has looked for common themes and patterns in the data related to the challenges faced by mathematics teachers and has interpreted the findings based on logical reasoning. By analyzing the data thematically, the researcher can identify the most significant challenges faced by mathematics teachers and how they relate to one another. Additionally, by using logical reasoning to interpret the findings, the researcher can draw valid and reliable conclusions that accurately represent the challenges faced by mathematics teachers in culturally diverse classrooms.

Diversity in Classroom but Uniformity in Teaching

On November 13, 2022, I observed the students of Class Three at my sample school, marking the first observation. I have since observed the class further to gain a better understanding of its nature and the strategies used by the teacher in response to this nature.

Upon entering the classroom, the teacher was greeted with respect by the students, who stood up and said good morning. The teacher responded to their greeting and instructed them to sit down. With the teacher's permission, I also entered the class. The teacher was teaching the lesson "Area" to Class Three and asked the students if they knew how to find it. Some students responded in Nepali and Bhojpuri that they did, while others responded in both languages that they did not. The teacher then explained in Nepali that area is defined as the total

space occupied by any object and gave examples of objects such as books, pens, and dusters. The teacher proceeded to draw a rectangle on the whiteboard with approximate measurements of angles and length. The students watched as the teacher drew the rectangle in their notebooks. The teacher then used a ruler to measure the length and width of the rectangle to find the area and concluded by using the formula $\text{area} = \text{length} * \text{width}$.

As a researcher, I have observed that the choice of language used as the medium of instruction in the classroom is an issue for maths teachers. The use of Nepali as the language of instruction seems questionable due to the influence of the local language and mother tongue. Although teachers use Nepali as the language of instruction, it can be difficult for students from different language backgrounds to understand the instructions given in class. In this line one of my participant (T₃) share his views as

I use Nepali as much as possible, but sometimes I use the learner's mother tongue. But, maximum use of Nepali creates challenges, as students cannot understand all subjects in Nepali due to low language proficiency.

Similarly, another respondent (T₄) expressed similar views about the medium used in teaching mathematics in a culturally diverse classroom.

However, another participant (T₁) expressed a different opinion:

In class, I mainly use Bhojpuri as my primary language and sometimes even Nepali. Using Nepali in the classroom creates challenges as learners come from different language backgrounds. They find it easy to learn in their own language.

Similarly, another respondent (T2) also expressed similar views about the medium used in mathematics classroom.

This shows that using the most of Nepali in the classroom creates many challenges. Learners come from different language backgrounds and their levels of understanding also not good. The medium of instruction should be decided on the basis of the majority of the language used by the learners in the classroom. In this line Ogbu (2000) claimed that Using Nepali as the primary language of instruction in the classroom may create problem for learners from diverse linguistic backgrounds, which could negatively impact their academic achievement. This demonstrates that maximizing the use of Nepali in the classroom can create several challenges. Learners come from diverse language backgrounds, and their levels of understanding may vary.

Lack of Students Active Participation in Teaching Learning

The involvement of students in teaching and learning activities is a vital part of classroom instruction. An improvement in student performance in the classroom is connected with increased student participation. The teacher might conduct many activities in the classroom to enhance student participation. They can alter the classroom environment to promote students' active participation in teaching and learning activities, and they can also design various activities inside the classroom. How do I? They must also listen to what students are saying and respond accordingly.

Some learners took engaged in teaching and learning activities effectively, while others did not. Students should engage in a variety of activities in the

classroom, including group work, role-playing, listening to the teacher, and asking and answering questions. However, not all learners took part in these activities, which made it difficult for the language teacher to impart knowledge.

In this line one of my participant (T₁) share his views as

Students in Nepal come from a variety of cultures, societies, castes, linguistic groups, etc. They are afraid to study since they are unfamiliar with maths. Therefore, encouraging active engagement from all students in MLT classes becomes a difficult issue for teachers.

Similarly, another respondent (T₄) also expressed similar. It demonstrates how difficult it is to get all students in a classroom to actively participate in teaching and learning activities. The educator must engage in a variety of activities to enhance student participation. In this line one of my participant (T₂) share his views as

In order to boost student engagement in teaching and learning activities, I first look into the reasons why they are not engaged before treating them in accordance with their requirements and interests. All of the efforts made by the government, community, school, and parents was be for nothing if the students are not involved in teaching and learning activities.

Similarly, another respondent (T₄) also expressed similar views. (1986, Vygotsky)

It demonstrates that a key component of classroom instruction is

student engagement in learning activities. All of the activities in the classroom would be useless if the students did not participate. It is therefore extremely difficult to teach every learner in accordance with their requirements and interests. In this line Vygotsky (1986) claimed that learning is a social and cultural process that involves active participation and interaction with others. That way if students are not actively participating in teaching and learning, it may be due to a mismatch between the instructional approach and the learners activities.

Challenges about Mixed Ability Class

The term "mixed ability class" describes a class where learners are at various stages of learning. Students in a mixed ability class, often called a heterogeneous class, have different levels of linguistic proficiency. Age and maturity, multiple intelligences, learning styles, linguistic proficiency, learner's first language, cultural background, and others are some aspects that contribute to heterogeneity in the classroom. Since the learner in the class came from diverse language, socioeconomic, and familial backgrounds, they were unable to comprehend the material in the same way. While some learners were able to comprehend the book after just one reading, others required more than one reading along with detailed information, teaching resources, and other methodologies, which presents difficulties for teaching and learning activities. In this line one of my participant (T₂) share his views as

Not every student has an equal capacity for learning. Students in the classroom came from a variety of backgrounds, and they had a range of

interests. Some people are interested in solving mathematical problems, while others are interested in applied mathematics, colors and figures, and extracurricular activities.

Similarly, another respondent (T₁) expressed similar views about the medium used in teaching mathematics in a culturally diverse classroom. It demonstrates how students in the mathematics classroom came from diverse backgrounds and had a range of learning styles. Some people were proficient in reading, writing, speaking, and other skills. Addressing every student's capacity in such a classroom presents difficulties for the teacher. However, another participant (T₄) expressed a different opinion:

Students' abilities in teaching and learning activities varies. Some students struggle when learning mathematics because they are kinesthetic, linguistic, naturalist, interpersonal, intrapersonal, etc. I find it difficult to deliver educational materials that are appropriate for all students. Similar to this, some students quickly grasp the material while others struggle due to linguistic differences.

Similarly, another respondent (T₃) also expressed similar views about about the medium of instruction employed in language teaching settings. This respondent said that while some students were able to grasp a concept after hearing it just once, others need more than one instance of detailed explanation.

Therefore, treating each teacher equally while teaching in a classroom with a variety of cultural backgrounds is extremely difficult. In

this line Ogbu (2000) claimed that students from different cultural backgrounds may have different beliefs and attitudes towards education that can affect their engagement and performance in math class. In summary, teaching math in a mixed-ability class can be a challenge for teachers, and cultural factors may play a role in students' academic performance.

Lack of Teacher's Skill in ICT

The day was November 28, 2022, and I went back to my model school. It was exactly noon when I got to the school. I overheard several of the kids talking about some of their subject matters. Then, at 12:15 p.m., the bell rang. When the second-grade mathematics teacher arrived, everyone stood up to greet him. The teacher responded, "Good afternoon class," and then instructed everyone to sit down. Geometrical figures was the subject that the teacher began to cover in class. The teacher draws an angle at the beginning and asks the students, "How many sides are there?" What number of angles are there? the same as when a teacher creates triangles and quadrilaterals and asks the same question?

As a researcher, I watched his classroom activities and discovered that he was lecturing about angles to introduce or explain them. He then began to draw angles using a ruler and a protector. He then used several standard examples of angles. He began by illustrating various angles with figures. He initially addressed the problem on the board and clarified it for the kids, telling them to copy it down in their notebooks. Finally, the teacher give a verbal evaluation of the learners and described the entire

lesson he had delivered that day.

When class was over, I questioned for teacher, T2, "Do you think there's any other contemporary technology to teach this chapter?" If yes, what difficulties do you have with using this approach? He replied,

"Modern technology now offers simple ways to instruct students. It is essential to maintain fundamental infrastructure, a strong economy, and qualified teacher if you want to teach using ICT. We have some ICT-based tools in our school, but since no one is available to operate them, we are unable to provide even the most fundamental information. I have to bring it from the office, plus there is a power demand problem, so it takes almost all of my 40 minutes. That is the major issue I have when using ICT technologies.

Similarly, other respondent expressed similar views about the medium used in teaching mathematics in a culturally diverse classroom.

According to the classroom observation described above, ICT is the most effective tool for learning new information if we are equipped and have the necessary people. The best students in the world appear to be those who employ ICT in teaching and learning activities. According to Dhital (2018), information and communication technology (ICT) has a significant role in enhancing the significance of teaching and learning activities. On the perspective of Nepal, the majority of the schools have ICT equipment, but there is no trained workforce for it. As a result, the teacher needs to receive ICT training. Maintaining diversity in the classroom would be simple if the

teacher used ICT effectively because it gives more ideas for the week.

Challenges about Student-Centered Environment

My hypothetical school, Gajedi Secondary School Kanchan 2 Gajedi, was on November 15, 2022. When I told the head teacher about my suggestion, he became pleased and agreed, as I had seen in the classroom discussions. The observation that day was scheduled by the head teacher for me in grade three. The subject matter expert had been a teacher for two years. He majored in mathematics and graduated.

When I entered instructor (T2classroom), he was teaching third graders. Area served as the lesson's topic. He started by delivering a lecture on the introduction to the lesson. The most of the time he lectured, with the debate method being used sporadically.

He described the relationship between length (L) and breadth (B) distances. If $L=B$, the object is referred to as a square; otherwise, it is referred to as a rectangle. On the white board was written a related formula.

Area of square is $A=L^2$

Area of Rectangle $A = L *B$

Then he wrote some formulas on the whiteboard for the areas of squares and rectangles and instructed the learners to copy them in their notebooks. The instructor displays a diagram of geometrical figures before choosing a few questions from the student's book and solving them on the whiteboard. The students copied it. Additionally, he asked the class whether they wanted him to answer any more of the exercises' challenging

questions. If not, you have homework to do. Student then said, "Let's give it a try. The class was then over. There were no educational resources used.

According to the classroom observation, the teacher began his lesson with a clear set of goals. The teacher made an effort to inspire the students to learn the material in mathematics. That implies that the instructor follows the first and second phases. The teacher clarifies the concepts and the subject, offers hints for challenging concepts or ideas, encourages the students, replies to their questions, and clears up any confusion. However, the teacher did not employ any teaching aids throughout class instruction, and the interactive part was not effectively carried out. The teacher summarizes the lesson and instructs the students, although he did not do so in a methodical way. According to Vygotsky (2009), meaningful discussion about teaching-learning topics and one another was result from this.

Section II: Ways to Overcome the Challenges in Culturally Diverse Mathematics Classroom

In this part, I explained how to address such learning issues in culturally diverse mathematics classes. I conducted an interview with a maths instructor and students for this purpose. I created themes for making mathematics classroom students comfortable by connecting their perspectives with theories. These are the following:

Use Mixed language as a Medium of Instruction

In a Mathematics learning classroom, students come from a variety of linguistic backgrounds; therefore, the entire language cannot be addressed. As a result, the medium of teaching should be chosen based on the majority of the languages spoken by students.

Language used by the teacher and other students may impair learners' performance in the classroom. In this circumstance, using their own language helps them understand the topic more quickly. In this line one of my participant (T₁) share his views as

I used students' mother tongues in the classroom to help them grasp the topic since students came from a variety of linguistic backgrounds and it is challenging for teachers to address those languages in the classroom. So I speak a medium language, Bhojpuri, and in certain circumstances Nepali, as well as Tharu when necessary because I am from the same community as the teacher.

Similarly, another respondent (T₂) expressed similar views. It demonstrates that it is difficult to handle all of the language used in the classroom since students come from a variety of linguistic backgrounds. In such cases, the medium of teaching should be chosen based on the majority of learners who speak the same language.

However, another participant (T₃) expressed a different opinion:

In the classroom, I mostly utilized Nepali as a medium language and, on sometimes, as the students' primary language. Because students come from many linguistic backgrounds, using Nepali in the classroom presents obstacles. They find it simple to study in their native language.

Similarly, another respondent (T₄) also expressed similar views. The use of mother tongue as a medium of instruction in a multilingual classroom can promote better learning outcomes for students, as it can improve their understanding and comprehension of academic content.

It also demonstrates that excessive use of Nepali language in the classroom reduces student performance, hence the instructor should use the learner's original

language in the classroom frequently. In this line Vygotsky (1986) claimed that Social Development, learning is a social and collaborative process, and the use of mother tongue can facilitate interaction and collaboration among students.

Teach with Well Planned Lesson

One of the most important techniques for teaching well in a bilingual classroom is to schedule lessons ahead of time. Good lesson preparation is the key to attaining goals in the teaching and learning processes. A well-prepared teacher may teach more effectively. Creating engaging classes takes a large amount of effort and work. If the teacher is already prepared to teach a certain lesson, he or she can do so efficiently. They record the objectives of the lesson, resources, teaching activities, and assessment techniques in their teaching diaries, which allows them to provide educational items to students who can grasp them. In this line one of my participant (T₁) share his views as

To make teaching learning activities effective and long-lasting, I used to teach with well-planned lessons. A well-planned lesson informs both the teacher and the students on the objectives, teaching learning activities, assessment system, and lesson outcomes. It assists the teacher in finishing the course on schedule.

Similarly, other respondent (T₂ and T₄) expressed similar views about teach with well lesson plan. However, another participant (T₃) expressed a different opinion:

I use a well-planned lesson plan when I teach. A well-planned lesson allows the instructor to educate with defined objectives as well as effective teaching materials and activities. It also aids in the evaluation of student performance. It assists the instructor in staying on track and completing the course on time with

enhanced learner understanding.

It demonstrates that in order to teach successfully, every teacher must prepare oneself on what to teach and how to teach in a classroom. To prepare themselves, they must do various tasks such as preparing lesson plans, materials, and so on. A well-planned lesson allows the instructor to define objectives, perform instructional learning activities, and evaluate the students. In this line Vygotsky (1986) claimed that Social Development, learning is a social and collaborative process, and using a well-structured lesson plan can facilitate interaction and collaboration among students. Ogbu (2000) also claimed that students from diverse cultural backgrounds may have different beliefs and attitudes towards education, and a lesson plan that is culturally responsive can help to address these differences.

Create Student Centered Environment

A student-centered teaching or learning environment is one in which students participate in various activities such as group work, peer collaboration, role play, and so on. Student-centered learning encompasses a wide range of educational programs, learning experiences, instructional techniques, and academic support measures designed to meet the unique learning requirements, interests, goals, or cultural backgrounds of individual students and groups of students. In this environment, students must teach themselves via their own efforts. In this line one of my participant (T₁) share his views as

I definitely create student centered learning environment in the classroom. In this environment, student's role is important all the activities are

performed by students. The teacher only facilitates them and help them if they need. Learner centered environment intended to address learner's needs and interests.

Similarly, another respondent (T4) also expressed similar views. It demonstrates that the learner's role is important in a learner-centered environment, and they actively participated in learning. In such cases, the teacher's responsibility is to assist students where they are having difficulty. However, another participant (T3) expressed a different opinion:

I establish a student-centered learning environment. They actively participate in teaching and learning activities in this environment, and classroom instruction becomes more effective. A student-centered environment allows teachers to address the needs and interests of their students. In this situation, many learning activities are readily and efficiently carried out.

Similarly, other respondent (T2) expressed similar views. Creating a student-centered environment can be particularly important in culturally diverse classrooms, as it can help to promote engagement and learning among all students. According to Ogbu's Cultural Difference and Discontinuity Theory, students from diverse cultural backgrounds may have different beliefs and attitudes towards education, and a student-centered approach can help to address these differences. In a student-centered environment, teachers prioritize the needs and interests of students, and provide opportunities for student collaboration and active participation in the learning process. Teachers can use strategies such as project-based learning, peer tutoring, and

differentiated instruction to create a supportive and inclusive learning environment.

Use of Teaching Materials

Teaching resources are essential to teaching and learning activities.

Teaching resources facilitate student learning and help students achieve success.

Different types of teaching resources were employed in the classroom, but they all had the capacity to promote student learning. Learning becomes more realistic when instructional materials represent abstract phenomena. They provided a high level of material retention over time. When selecting educational materials, consider the learner's age, gender, level, need, and interest. Similarly, it should be easily accessible and used in a language education classroom. In this line one of my participant (T₁) share his views as

I employ several sorts of teaching materials to facilitate teaching learning activities in a culturally diverse classroom because teaching materials assist students in simply understanding the teaching items. Actual objects, models, photos, charts, maps, flash cards, flannel board, white board, and other low- and no-cost resources were employed. Similarly, I teach with tape recorders, televisions, and film projectors.

He contended that using instructional materials in learning activities made the classroom more enjoyable and effective. To help pupils grasp the instructional contents, he employs a variety of resources, including visual, audio, and audio-visual elements. However, another participant (T₃) expressed a different opinion:

As readily available as teaching resources have been used to assist teaching learning activities in a bilingual classroom. I've used real objects, models, photographs, charts, flash cards, and slides.

Similarly, other respondent (T2 and T4) expressed similar views. It demonstrates how the usage of instructional materials facilitates teaching and learning activities.

It demonstrates how the usage of instructional materials facilitates teaching and learning activities. Different teaching resources, such as actual objects, models, images, charts, and flash cards, aided in the presentation of educational items in the language instruction classroom in an easy and effective manner. In this line Vygotsky (1986) claimed that learning is a social and collaborative process, and teaching materials can facilitate interaction and collaboration among students. Ogbu (2000) suggests that students from diverse cultural backgrounds may have different beliefs and attitudes towards education, and using materials that are culturally relevant can help to address these differences.

Use of Information and Communication Technology (ICT)

Using information and communication technology (ICT) in the classroom, the teacher may simply and effectively convey various educational elements. This is the contemporary period of technology. Modern technologies are being employed in a variety of fields, one of which is education. In the educational sphere, the use of ICT such as mobile phones, computers, projectors, the internet, email, e-books, and so on makes language teaching and learning activities more attractive and sustainable. ICT-based teaching and learning assist pupils in retaining the text in their long-term memory. ICT

enables teachers to offer educational materials in a concise, simple, and effective manner. In this line one of my participant (T₁) share his views as

I use ICT in the classroom to help students and offer educational materials in an easy-to-understand format. In the classroom, I largely used my cell phone and laptop, as well as the internet, as ICT tools.

It demonstrates how the usage of ICT in the classroom assists teachers in facilitating students and conveniently presenting educational materials. The learners could readily grasp the teaching materials supplied via ICT. Similarly, through the use of ICT, learners look for and discover new things on their own. Similarly, another respondent (T₃) stated:

I utilize ICT in the classroom as a tool for effective teaching. Various new technologies make it simpler to deliver educational materials in the classroom. In the Mathematics teaching classroom, I usually used my cell phone and laptop as ICT tools.

He also claimed that many ICT technologies were employed as excellent teaching resources in language instruction classrooms. Complex phenomena were presented to learners in an easy and clear manner using ICT. He utilized a cell phone, a laptop, and a PC as ICT tools. Similarly, two of my respondents (T₂ and T₄) agreed:

We utilize a laptop, mobile phone, and a projector in the classroom to easily present unknown educational subjects.

It demonstrates that by utilizing ICT in the classroom, the teacher may easily and

successfully teach various instructional topics in a multilingual classroom. In this line according to the theory of constructivism, learning is an active process that involves the interaction between the learner and the environment, and ICT can provide a means of creating a rich learning environment that promotes interaction and collaboration among students. Additionally, the use of ICT can be helpful in addressing the differences in learning styles and cultural backgrounds of students in the classroom. By providing access to diverse digital resources and incorporating interactive technologies, teachers can promote effective learning and engagement in a culturally diverse classroom. The use of ICT can also help to address the challenges of language barriers and support students in developing digital literacy skills that are important in today's society.

Develop Rapport

It is extremely difficult to establish positive relationships with students, parents, other professionals, and communities. It is very important to connect with pupils and develop a strong rapport or close relationship with them. Effective teaching requires rapport. A teacher cannot be effective in the classroom unless they have positive relationships with their pupils, parents, and colleagues. To foster positive relationships with students, staff, and parents, they scheduled frequent meetings and, on occasion, personal meetings with students, parents, and staff to discuss how to teach effectively in a bilingual classroom. In this line one of my participant (T₄) share his views as

The teacher-student interaction should be good in every classroom. I meet with students and parents on a frequent basis to discuss teaching and learning activities as well as student performance in order to build a strong connection with them and other approved individuals. I regularly

motivate students to try something different.

Similarly, other respondent (T1 and T3) expressed similar views.

Participants stated that a positive relationship between the instructor and the students in the mathematics teaching classroom always helps them achieve excellent learning accomplishment. To establish a positive rapport, the instructor should consistently encourage pupils. However, another participant (T2) expressed a different opinion:

I urge students to participate in teaching and learning activities in order to build a strong connection with them. I visit with them informally to learn about their classroom challenges, and I also meet with their parents to learn about their condition.

It demonstrated that developing rapport between teachers, students, and parents is essential for effective mathematics teaching in a culturally diverse classroom.. Ogbu's Cultural Difference(2000) suggests that students from diverse cultural backgrounds may have different beliefs and attitudes towards education, and building rapport with parents can help to address these differences. Teachers can develop rapport by demonstrating a genuine interest in students' cultural backgrounds and experiences, and by using inclusive teaching practices that prioritize the needs and interests of all students. Teachers can also involve parents in the learning process by providing regular updates on student progress and by encouraging parent involvement in classroom activities. By developing rapport with teachers, students, and parents, teachers can create a supportive and inclusive learning environment that promotes effective learning and engagement in a culturally diverse classroom.

Using Culturally Relevant Pedagogy for Mathematics Teaching

In mathematics, we rarely find topics that are of interest to us. The book's introduction includes a list of the formulae. Then there was be a number of examples and practice questions. The topic content for almost all of the math lessons in the classroom is the same. Our school has a large percentage of students from indigenous backgrounds. But there is nothing about our culture included in our textbook. When our instructor presents examples, he only uses those that are unique to his own experience, religion, culture, and tradition, which is something we find to be quite unfamiliar. We would find mathematics subjects to be simple if the examples we study in math were also based on the surroundings of our own culture. We have a difficulty with language acquisition.

Our teachers do not comprehend our language. In the early years of school, we also struggle to read in a language different than our native tongue. Can we learn mathematics more effectively by taking these factors into account?

Student expressed this viewpoint during an in-depth interview.

In this way, mathematics is a result of human inventiveness. Its applications depend on people taking acts based on their personal experiences. It is constrained and shaped by the brain and mental capabilities of humans. Hersh (1997), who claimed that "The rule of language and of mathematics are historically established by the functioning of society that grows under the pressure of the inner workings and interactions of social

groupings and physical laws," provided support for this viewpoint.

Using culturally relevant pedagogy for mathematics teaching in a culturally diverse classroom can help to improve engagement and learning outcomes for all students. According to Vygotsky's Constructivism Theory (Vygotsky,1986) of Social Development, learning is a social and collaborative process, and incorporating students' cultural backgrounds into instruction can facilitate interaction and collaboration among students. Ogbu's Cultural Difference and Discontinuity Theory (Ogbu, 2000) suggests that students from diverse cultural backgrounds may have different beliefs and attitudes towards education, and a culturally relevant pedagogy can help to address these differences. By using culturally relevant examples and teaching methods that incorporate students' cultural backgrounds, teachers can promote effective learning and engagement in a culturally diverse classroom. This can include using relevant cultural examples in math problems, and incorporating diverse teaching methods such as peer tutoring and project-based learning.

Chapter v

Findings, Conclusion and Implications

This chapter provides a comprehensive overview of the study's findings, conclusions, and implications, based on the analyzed data and key results. The findings highlight the significant trends, patterns, and relationships observed in the data, providing valuable insights into the research question. The conclusions drawn from the findings reflect a deeper understanding of the issue being studied and offer important implications for practice and policy.

In addition to the findings and conclusions, the chapter also discusses the implications of the study for further research, policy, and practice. The implications provided are intended to guide future research and inform policy decisions, and offer practical strategies for addressing the issues identified in the study.

Findings

Finding refers to the process of discovering or uncovering something that was previously unknown or hidden. It can involve seeking out information, locating an object or person, or coming to a realization or understanding about a particular topic. The conclusions are offered below based on the analysis and interpretation of the data:

Findings Related with Challenges

Data analysis revealed that teaching mathematics in a classroom with a varied range of cultures presented a number of difficulties for math teachers. The following are some challenges-related findings:

Language barriers. It was found that students come from different cultural backgrounds, they speak different languages/have different levels of proficiency in the language of instruction. This make it challenging for teachers to communicate effectively and ensure that all students are able to understand the material.

Cultural differences. It was found that Students come from different cultural backgrounds with different beliefs, values, and customs. This create misunderstandings and conflicts in the classroom when teachers are not aware of and sensitive to these differences.

Different learning styles. It was found that Students from different cultural backgrounds have different learning styles and preferences. Teachers need to adapt their teaching strategies to accommodate these differences.

Limited resources. It was found that Teachers may have limited resources, such as teaching materials or technology, that are not culturally relevant or appropriate for a diverse classroom.

Lack of training and support. It was found that Teachers may not have received adequate training or support to work effectively with culturally diverse students. This can lead to frustration and burnout.

Lack of student interest. It was discovered that many students were not interested in learning mathematics because they believed that it was required of them and that their only goal was to pass the exam, which presented difficulties. It was also discovered that students were unaware of their

responsibilities and duties because they came from varied cultures and backgrounds, which affected their habits, presenting difficulties in multilingual classrooms.

Ways to Address the Challenges of Related Findings

Following data analysis and interpretation, it was discovered that Mathematics teachers employed a variety of techniques to address those issues. The following solutions to connected discoveries' difficulties were presented:

Feel confident.Data analysis revealed that teachers were confident in their content and in delivering instructional learning resources. A positive work environment, appropriate workloads, and community involvement all help teachers build confidence.

Address language barriers.Teachers can use visual aids, hands-on activities, and other techniques to help students who have limited proficiency in the language of instruction understand math concepts. They can also work with language support staff or provide extra support outside of class.

Make good relationship.When teachers have positive relationships with their students, parents, and staff members, it can improve learning in the classroom. Teachers can build relationships with families from diverse backgrounds and communicate with them about their child's progress and needs in math. They can also seek input and feedback from families on ways to improve their teaching practices.

Make well-plan. Teaching with a well-planned lesson plan can help teachers achieve their goals and manage their classroom better.

Create student center environment. Teachers should make their math classes learner-centered, which means students should participate actively in different classroom activities. Teachers need to use different teaching methods, such as visual aids and technology, to cater to students' various learning needs. Encouraging students to work together and share their ideas can create a positive and inclusive classroom environment where everyone can learn from each other.

Use teaching materials. Teaching materials play a crucial role in making learning more practical and understandable for students. ICT (Information and Communication Technology) can be a useful tool for teachers to provide educational materials to students with different abilities in culturally diverse classrooms.

The use of the learner's first language as a medium of instruction was discovered to boost student interest and engagement in teaching and learning because the medium of instruction should be chosen based on the majority of the languages utilized by learners.

Conclusion

There are several challenges including language barriers, cultural differences, different learning styles, limited resources, lack of training and support, and disinterest among students in teaching mathematics in a culturally diverse classroom.

To minimize the above mentioned challenges the stake holder related to mathematics education should have to focus on making local curriculum and more cultural related teaching learning materials. The mathematics teacher needs to emphasize on students friendly teaching learning strategy such as using mixed

language. To address these challenges, teachers employed various techniques such as using visual aids, hands-on activities, and communicating with families from diverse backgrounds. They also made their classes' learner-centered, utilized technology and teaching materials, and encouraged students to work together. Using the learners' first language as a medium of instruction was also found to boost student interest and engagement in teaching and learning.

Pedagogical Implications

After analyzing and interpreting the collected data, the study suggests the following educational implications:

- Teachers should feel confident and prepared while presenting instructional materials in a culturally diverse classroom.
- Building strong relationships with students, parents, and staff members is essential for effective education.
- Teachers should approach the classroom with a well-planned lesson plan.
- Creating a learner-centered teaching environment is preferable in a culturally diverse classroom.
- ICT, body language, and instructional materials can be effective tools when teaching in a culturally diverse classroom.

Ultimately, it is preferable for teachers to adopt teaching practices that consider the learner's mother language to meet their needs and interests in a culturally diverse classroom.

Implications for Policy

To make progress in any program, it is essential to have a plan that is achievable,

dependable, and adequate. Creating policies is also critical for the successful implementation of a program. Based on the findings, some policy implications are suggested below:

-) It is better to have comprehensive legislative measures to establish mother tongue-based multilingual education.
-) The Ministry of Education should provide resources related to ICT to all public schools.
-) Explicit provisions for the medium of teaching used in the multilingual classroom should be included.
-) Teacher service Commission (TSC) needs to the recommendation by the checking about teacher and students language/ culture status.
-) Provence/Local level can conduct training about teacher language and other related culture problem by the collaboration with belongs to school.

Reference

- Acharya, B.R. (2015). *Foundation of mathematics education*, Kathmandu; DikhsantaPrakashan.
- Air,S.B. (2018).*Studies in difficulties in learning mathematics of Raute children*. Unpublished Master’s thesis, Tribhuvan University, Department of Mathematics Education, Kritipur.
- A.U.Levison,et.al.(Eds.); *Schooling the symbolic Animal*,(p. 190-206).Oxford;Rawman& LittlefieldPublishers,Inc.
- Bhandari, S.D (2015). *Studies in Problems of classroom management in learningmathematics*. Unpublished Master’s thesis, Tribhuvan University, Department of Mathematics Education, Kritipur.
- CentralBureauof Statistics(2068).CensusofNepal,Kathmandu:GovernmentofNepal.
- C. E. Snow and M. H Hohle or Snow, C. E. and all (1978) “*The Critical Period forLanguage Acquisition: Evidence from Second Language Learning*”PublishedbyWiley.
- EuropeanCommission. (2007).Finalreport:Highlevelgroupon multilingualism. Luxembourg: European Communities. Retrieved fromhttp://ec.europa.eu/education/policies/lang/doc/multireport_en.pdf
- Governmentof Nepal(2015). *Constitutionof Nepal*.(2015).Kathmandu:Author.
- Governmentof Nepal, (1990). *TheConstitutionoftheKingdomofNepal(1990)*, Kathmandu:Author.

Lubienski, S.T (2005). *Studies in Problem Solving as a Means Toward Mathematics for All: A Look Through a Class Lens*’.

Ministry of Education (2001). *Education act of Nepal: 7th Amendment* (2012), Kathmandu: Author.

Nepal National Education Planning Commission (1956), *Education in Nepal: Report of the Nepal Education Planning Commission*. Kathmandu, Nepal: His Majesty’s Government.

Niure, D.P. (2014). *Studies in Indigenous knowledge of Tharus related to educational practices: Implication in Formal Schooling*. Unpublished M. Phil Thesis. Tribhuvan University, Department of Mathematics Education, Kritipur.

Pandey, D.P (2019). *Studies in Exploring learning environment in mathematics classroom*. Unpublished Master’s thesis, Tribhuvan University, Department of Mathematics Education, Kritipur.

Paudel (2066), *Studies in The Effect of Mother Tongue on Children's Classroom Learning*. Unpublished Master’s thesis, Tribhuvan University, Department of Mathematics Education, Kritipur.

Setati, (2005) ‘‘*Teaching Mathematics in a Primary Multilingual Classroom*’’ South Africa.

Sitaula, P (2022). *Studies in Overcome the learning Difficulties of students in culturally Diverse Mathematics classroom*. Unpublished Master’s thesis, Tribhuvan University, Department of Mathematics Education, Kritipur.

Ogbu, J. (2000). Understanding Cultural Diversity and Learning. In Bradley.

Tamang (2003). *Studies in The State of Tamang Mother Tongue Teaching.*

Unpublished Master's thesis, Tribhuvan University, Department of
Mathematics Education, Kritipur.

UNESCO.(2003). *Education in multilingual world.* Education position paper.

France.

Vygotsky, L.(1998). *Mind in society; Development of higher
psychological processes.* Harvard university press.

Appendix- I

Interview format for subject Teacher

Name of teacher:

Date:

Qualification:

Experience:

Address:

Gender:

Name of school:

The interview with the mathematics teacher was taken in the following heading points.

-) Teaching method and material.
-) Use of ICT.
-) Relation between student-teacher in the classroom
-) Classroom management and learning environment
-) Student participation in learning mathematics
-) Cultural diversity in your classroom
-) difficulties of cultural diversity classroom.
-) Recommendations

Appendix-II

Interview format for respondent students

Name:

Date:

Class:

Gender:

Address:

Age:

Name of school:

The interview with the respondent students was taken in the following heading points.

-) Respondents Introduction.
-) Family background (parent's education, occupation, member, economic status, etc.)
-) Student's interest in learning mathematics.
-) Time spends in learning and practice.
-) Learning environment at home and school.
-) Teacher's behavior toward students.
-) Opinion a teacher's teaching technique, method and material.
-) Parents support for learning.
-) Relation between teacher-student.

Appendix-III

Classroom Observation Form

The teacher's name:

Observation Date:

Time Observed:

The observed class's level was:

Observed school's name:

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Classroom Design

ClassroomType

ClassroomType	Monolingual	Multilingual	Homogeneous	Heterogeneous
pe				

QualitativeInformation:

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