

DIFFICULTIES FACED BY LIMBU STUDENTS IN SOLVING WORD PROBLEM OF
ALGEBRA AT SECONDARY LEVEL

A

THESIS

BY

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LETTER OF CERTIFICATE

This is to certify Mr. Thomashlimbu, a student of the academic year 2020/021 AD with thesis number....., Exam Roll No. 7628214 and T. U Regd. No. 9-2-7-90-2014 has completed his thesis under supervision of Asst. Prof. LokNathBhattarai, during the prescribed by the rules and regulations of T. U. Nepal. The thesis entitled “Difficulties Faced by Limbu Students in Solving Word Problem of Algebra at Secondary Level” embodies the result of his investigation conducted from 2023 to 2024 at the Department of Mathematics Education, University Campus, Tribhuvan University, Kirtipur, Kathmandu. I hereby recommend and forward his thesis for the evaluation as the partial requirements to award the Degree of Master in Mathematics Education

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LETTER OF APPROVAL

This thesis entitled "Difficulties Faced by Limbu Students in Solving Word Problem of Algebra at Secondary Level " submitted by Mr. ThomashLimbu in partial fulfillment of the requirement for the Master Degree in Mathematics Education has approved.

Viva- Voce Committee

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RECOMMENDATION FOR ACCEPTANCE

This is to certify that Mr. Thomashlimbu has completed his M.Ed. thesis entitled "Difficulties Faced by Limbu Students in Solving Word Problem of Algebra at Secondary Level" under my supervision during the period prescribed the rules and regulation of Tribhuvan University, Kirtipur, Kathmandu, Nepal. The study embodies the result of investigation conducting during the period of 2023-2024 under the Department of Mathematics Education, University Campus, T.U. Kirtipur, Kathmandu. I recommend and forward his thesis to the Department of Mathematics Education for the final viva-voice.

.....

Asst. Prof. LokNathBhattarai

Supervisor

Declaration

This dissertation contains no any material which has been accepted for the award of another degree in any institution. To the best of my knowledge and belief, this research is truly based on my own effort and doesn't contain any materials that were published earlier in this university as well as others except due acknowledgement has been made.

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Abstract

This study investigates the difficulties faced by Limbu students in solving algebraic word problems at the secondary level. The primary objectives are to identify the difficulties and explore their underlying causes. Grounded in social constructivism and cultural discontinuity theories, the research aims to understand how the native language and cultural backgrounds of Limbu students affect their mathematical problem-solving skills. Ethnographic research design was employed in this study to explore the real problems faced by Limbu students. The sample consisted of Limbu students from Thechambu Secondary School in Taplejung. Data were collected through written test, interviews, and document reviews to ensure a comprehensive understanding of the students' challenges. The findings indicate that Limbu students face significant difficulties in understanding problem statements, translating them into mathematical expressions, and applying appropriate strategies. Language barriers, cultural differences, and educational discontinuities were identified as major contributing factors. The study concludes that there is a critical need for culturally responsive teaching methods and improved educational resources to enhance mathematical comprehension and performance among Limbu students.

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Introduction

This chapter consists of background of the study, statement of the problems, objectives of the study, research questions, significance of the study, delimitations of the study, and operational definitions of the key terms.

Background of the Study

Nepal is a small country in an area but large in diversity in language, culture, nature, ethnic group, religion and so on (Bhattarai & Bhattari, 2004). Nepal is situated in the south Asian region sharing two great neighboring countries border. These are The People's Republic of China in the north and India in the south, east and west. The fact that the population census (2021) informed that there are 142 different caste groups in Nepal. Society is ethnically diverse and complex in phenotype and culture from Indian to Tibetan. The major two groups in Nepalese society are Tibet Mangolins from the north and the Indo-Aryan from the south and there are many ethnics groups in Nepal. (Edingo & Limbu, 2007) The traditional area of the Limbu community is known as Limbuwan, which is located in the eastern part of Nepal. Limbuwan historically comprised the region stretching from the Arun River in the west to the Kankai River in the east, and from the plains of the Terai in the south up to the Himalayas in the north. They have rich in customs and traditions. In special occasion they exchange Tongba and pickle meat in Perengo. The design of tongba is look like a cylinder and prerngo are made with many regular pentagon shapeso they have also rich in ethno mathematics.

Mathematics is one of the most important subjects inside school as well as outside the schools in modern society and it is developed according to the human needs. It is the result of human activities, society, cultures and values. Mathematics is

a part of human life. It was created to fulfill human needs. Mathematics is closely related with culture, society, caste, ethnicity, environment, religion. Culture and mathematics have a strong relationship(Binod, 2022). The language is not merely a means of communication, but it is also a vehicle of understanding. Students make sense or create meaning in their language. The most efficient way to make meaning or creating a concept of mathematics is in own mother language. I think, there is a lack of ability and lack of understanding because students' languages are different in our school and home context. The official mathematics is socially and culturally neutral in the context of Nepal. There is increasing awareness of language and its impacts on mathematics learning (Orton 1996).

Word problem are a fundamental component of mathematics education it works as like as a bridge between abstract mathematical concept and concrete mathematical concept which are real world applications(Savard, 2018). These problems present mathematical challenges in the form of written or verbal scenarios requiring student to decipher the information, formulate equation or expressions and ultimately arrive at a solution.

Word problem is a bridge where the gap between abstract mathematical concepts and real-world situations They show students how mathematics is used in everyday life, making it more relevant and practical so it's one of importance is real world application. Word problems require critical thinking and problem-solving skills. Students must analyze the information given, identify the appropriate mathematical operations, and apply them to solve the problem. This cultivates valuable analytical skills that extend beyond mathematics. It helps problem solving and critical thinking so it would be important of word problem. Word problems help students understand mathematical concepts in context. Instead of memorizing

formulas and procedures, students learn how to apply them to specific situations, enhancing their understanding of mathematical principles so contextual understanding is also benefit of word problem. Geary, D. C. (1994) stated that students cannot solve word-problem tasks accurately although they can complete the computation part of the task. Word problem is one upper level of computation parts of problem that's why students' needs more and clear concept and sufficient knowledge about the topic.

Generally, most of our students feel difficulties on solving word problem so, I intend to find why students feel so difficult to solve word problem.

Statement of the Problem

This study is mainly concerned about the difficulties faces by limbustudents in solving word problems of mathematics. Limbu students are culturally different than mainstream schools' cultures that are shaped according to Aryan Khasa culture may have problems in communication and learning to other casts students. Generally, most of the students feel difficulties to learn mathematics but few of them are interested computing algorithm and getting answer. Few students which are interested in mathematics but they have anxiety on mathematics word problems. Limbu students also feel difficult to learn mathematics as well as solve word problem. Limbu students learning level of mathematics is very low. Reason of low achievement may be their society, their belief, culture, language, guardian's education level, poverty, access and so on. Craig, T (2001) For decades, mathematicians and mathematics educators acknowledged that students find such mathematical tasks challenging Craig. Many of students can't complete the challenge and word problem is like a phobia of mathematics. Doorman and Maanen (2008) state that solving algorithmic procedures is much easier for students than understanding the concepts behind them. Educators

emphasize that teaching and learning mathematics should not be limited to only implementing procedures or applying algorithms. According to Lambdin, (2003) working with word-problem tasks is a crucial phase to foster understanding of mathematical concepts. Solving word-problem tasks is one vital learning outcome in most mathematics courses and is considered an important skill that must be mastered by students. Such tasks like word problem can also be used to assess the level of comprehension to the mathematical concepts. In fact, using word-problems in mathematics instruction was described as the heart of mathematics

The language forms and strategies we use in mathematics teaching differently favor some social groups over others. We realized that language is one of the major cause of marginalization because our teachers support some students while it may disadvantage other students through the choice of language used in the classroom. Some students might be excluded from the classroom practice due to language as a barrier. Hence, there exists a social class of students that has the poor participation and less engagement in the classroom.(Sepeng, 2015) Due to the difference of school language different from home language, students face different obstacles like gap between home and school culture.

Most of these languages have been dominated by Nepali and English in schools in Nepal (UNESCO 2011). Although primary education in many schools has adopted classroom instruction in children's first language with positive results of increased interaction between students, students and teachers, and parents and teachers, and improved students' performance, it has been an issue again once they complete their primary school. In some community, the teacher does not understand students' native language. Students do not understand the language of teacher. Then there is a problem in teaching and learning mathematics. Some of the families do not

understand the national language Nepali in our context. Then, they cannot help their children at home too because of the difference in cultural of speaking and writing at home and in the school or classroom. However, a study by UNESCO (2011) shows that “parents are not ready to accept teaching only in Limbu language, and that they also demand teaching of a few subjects in English”.

Word problems of Mathematics pose a significant academic challenge for students across various cultural and linguistic backgrounds. The Limbu community, with its distinct cultural and linguistic characteristics, may face unique difficulties in comprehending and solving mathematical word problems at the secondary school level. The purpose of this study is to identify and explore the specific obstacles encountered by Limbu students in the process of solving mathematical word problems, aiming to contribute insights that can inform targeted educational interventions.

Due to the student difficulties with solving world problem, their mathematic achievement declined. Consequently decreases in national mathematic achievement. To address this problem I choose this topic.

Objectives of the Study

The objectives of this study are as given below.

- To identify the difficulties that Limbu students faces when solving the word problems of algebra.
- To explore the causes of difficulties faced by Limbu students when solving the word problem of algebra.

Research Questions

Following are the research questions of this study:

- What are the difficulties that Limbu student faced when solving word problems of algebra?
- What are the causes of difficulties that Limbu students faced in solving word problems of algebra?

Justification/Rationale of the Study

Mathematics is a crucial subject for students to master, as it is essential for success in many academic and professional fields. However, research has shown that Limbu students in Nepal consistently underperform in mathematics compared to their peers from other ethnic groups. This is particularly evident in the area of mathematical word problems, where Limbu students often struggle to comprehend the problem statements and translate them into mathematical equations. There are several potential factors like Linguistic barriers, Cultural differences and Lack of resources that may contribute to the difficulties faced by Limbu students in solving mathematical word problems.

Addressing the difficulties faced by Limbu students in solving mathematical word problems is essential for promoting equity and ensuring that all students have the opportunity to succeed in mathematics. A study on this topic can help to identify the specific challenges faced by Limbu students and develop effective interventions to address these challenges. Specific benefits of the study are as follows:

- The study would provide valuable insights into the difficulties faced by Limbu students in solving mathematical word problems.
- The findings of the study can be used to develop strategies and interventions to help Limbu students to improve their performance in mathematics.

- The study can contribute to a more inclusive and equitable education system for all students in Nepal.

Delimitation of the Study

This study focused on the difficulties faces by Limbu students in solving word problems of mathematics at grade 'IX'. The delimitations of this study were as follows

- This study was delimited to Thechambu secondary school PathivaraYangwarak 2 Taplejung.
- This study was delimited to Limbu students of Grade 'IX'.
- This study was confined on word problems of algebra at Grade 'IX'.
- The study was conducted on public school.

Operational Definition of Key Terms

Ethnic group.In this study ethnic group refers to a specific group of people having common culture,tradition and language. For this study Limbu is targeted ethnic group.

Word Problems.In this study word problem refers to mathematical problem presented in the form of only written description.

Cultural Diversity .In this study cultural diversity refers to differences in customs, traditions, languages, and cultural backgrounds among people.

Mother Toungue. In this study Mother Tongue refers to the first language or native language that a person learns in childhood at home within their family or local community. The Primary languages speak by Limbu students are taken as Mother Tongue.

Parents. Parents in this study refers father, mother, brother, sister and other relative persons of Limbu students of grade IX.

Students. Students in this study refers to the person who is studying at grade IX and belongs from Limbu community.

Limbu People. In this study Limbu people refers to an indigenous ethnic group in eastern Nepal, known for their unique language, script, and cultural traditions.

Chapter II

Review of Related Literature

Literature review means locating and summarizing the studies about a topic. It is compact written summary of journal, articles, books and other document that portrays the past and current state of information on research topic which is going to be studied (Creswell, 2014). The main purpose of review of related literature is to find out what works have been done to the area of study being under taken. It helps to conduct the new research study and avoids the necessary duplication. This chapter describes the empirical literature, theoretical literature and conceptual framework of the study.

Review of Empirical Literature

Each and every research work requires the knowledge of previous background to open the targeted objectives and to validate the study. Here this section was an attempt to review the related studies, articles and the report: -

(Gerofsky, 1996) published an article entitled "A Linguistic and Narrative View of Word Problems in Mathematics Education Most word problems" and conclude that word problems follows three component compositional structure. First one is a "set-up" component that established the characters and location of the putative story. Second one is an "information" which gives the information needed to solve the problem and third component is "A questions". Similarly, according to (Wickelgren, 1974, 10) A single word problems has of three types of information first is information concerning givens second is information concerning operations that

transform one or more expressions into one or more new expressions and third is information concerning goals.

Likewise, Seifi et al. (2012) studies on topic Recognition of Students' Difficulties in Solving Mathematical Word Problems from the Viewpoint of Teachers. The objective of this study was to find the students difficulties solving mathematics word problem from their teacher prospective. This study is based on mixed design. This study is conducted with 52 mathematics teachers (18 female & 34 male) from Arak middle schools whom were selected randomly. Data were gathered through the use of an interview guide. The results of the content analysis demonstrated that almost half of the teacher's responses (51%) indicated that solving mathematics word problems is difficult for students because students struggle with representation and understanding the problems. Two other difficulties cited in teachers' responses involved student's inability to make a plan to solve the problem (31%) and a lack of vocabulary knowledge (10%). And causes of student difficulties fell into four areas: text difficulties (39%), unfamiliar contexts in problems (26%), using inappropriate strategies (17%) and language factors (12%) were the causes of student difficulties. Teachers suggested to help students in teaching them to look for a pattern, draw a picture and rewording the problems.

Similarly, Nepali, (2020) conducted a research entitled Difficulties Faced By Gurung Students in Learning Mathematics. The main aim of this study is to explore the difficulties faced by the Gurung students in learning mathematics. The design of the study is a case study. Three community schools of Gorkha district were selected by purposive sampling procedure and five students from these schools are selected as a sample. Data collection was taken by Classroom observation form, interview guideline with students, parents, mathematics teachers and head teachers and

document review. For data analysis thematic and triangulation methods were used. On the basis of analysis and interpretation of data, researcher found that, home and school environment are not similar for the Mathematics learning, Gurung students have their own language they were from illiterate and low economic family background, parents are careless in their children's education, lack of teaching materials in the classroom, lack of trained teachers, students do not read and practice at home, lack of discussion and lack of inter-relationship between other caste are the causes of difficulties of Gurung students in learning Mathematics. He gave several ways to address the causes of difficulties these ways are school should provide good environment like hostel facilities, scholarship and manage IT programs, teacher should make educational teaching materials, take a different test and provide feedback immediately school administration should make rules and applying them. Parents should be regular visits in the school and maintain home environment and Mathematics teachers should be focused on student-centered learning.

Moreover, Adhikari & Ishizaka, (2021) published an article entitled "Impact of Model Drawing and Visualization to Solve Word Problem of Equation at Grade-8 in Nepal". The objectives of this research was to know solving mathematic word problem through model drawing and visualization is effective or not. This study is based on quantitative design. For this study researcher selected 25 students randomly as an experimental sample and pre-test consisting six-word problem administrated to the students to determine the baseline. Post-test consisting six-word problem administrated to the students to detect the effect. The data was analyzed using parametric t-test. The result shows a significant difference between the mean achievement of students before and after treatment. Use of model drawing and

visualization improves student's knowledge, comprehension and application ability to solve word problems of equation.

In the same way, Dahal, (2022) published a thesis entitled "An error analysis in solving word problems in algebra at the secondary level". The objective of this study was identify the errors done by students in solving word problems in algebra of mathematics at the secondary level and to identify the leading factors that affect solving word problems in mathematics at the secondary level. This is a quantitative and descriptive survey design research. Researcher selected 25 students from two school and take interview both school principle. The study revealed that students had committed several errors in solving the word problems in algebra. The study showed that the maximum error was committed in comprehension (30.7%) and the least was committed in Process skill error (15.3%). There were many factors such as, lack of basic conceptual knowledge in algebra, language problems, less practice in word problems, the attitude of students towards algebra, teacher's qualification and performance, lack of practice and mixed-up rules were responsible causes of errors made.

Mahara (2010) did a study called "Difficulties in Learning Mathematics of Tamang Students at Lower Secondary Level." He wanted to see how the home environment affects Tamang children learning math at school. He used a qualitative research method and chose five students from class VII using non-probability sampling. To collect information, he used in-depth interviews, observation, and written documents. The study found that many Tamang families can't afford to send their children to school or continue their education because of financial issues. Also, large family sizes make it hard for children to have a good learning environment for math.

Joshi (2020) conducted a study to explore the difficulties DanguraTharu students face in learning mathematics at the lower secondary level. His objectives were to identify these difficulties, understand their causes, and propose solutions. He reviewed several theories, including Bourdieu's cultural theory, Ogbu's cultural difference and discontinuity theory, Bernstein's language theory, and Vygotsky's social constructivism, to frame his research. Joshi used a qualitative approach with an engaged ethnographic strategy, focusing on a rural government school in the Kanchanpur district where DanguraTharu students are prevalent. He employed purposeful sampling to select 14 participants: five DanguraTharu students, their parents, a mathematics teacher, a head teacher, and two mathematics educators. Data collection methods included in-depth interviews, observations, and document analysis. Joshi found that the students faced challenges due to language barriers, low self-efficacy in mathematics, insufficient prior knowledge and lack of culturally relevant curricular materials, traditional teaching methods, and classroom discrimination. He also identified underlying causes such as the disconnect between school and home cultures, negative attitudes towards mathematics, low economic status, lack of parental education, poor interpersonal relationships, over-aged enrollment, and absenteeism. To address these issues, Joshi suggested providing extra time and support for students, motivating and counseling them based on their individual needs, promoting collaborative group work and cooperative learning, and utilizing culturally relevant pedagogy and ethno mathematics.

Cecilia & Oviedo, (2005) did a study titled "Comprehending Algebra Word Problems in First and Second Languages" used a mixed-methods approach to explore how bilingual students understand algebra word problems in their first language (Spanish) and second language (English). The methodology included survey. The

findings revealed that students generally performed better in the language of instruction (English) and preferred equations over word problems. Linguistic factors, such as text comprehension and the abstract nature of mathematical language, significantly impacted their problem-solving abilities. The study suggests that bilingual education should incorporate both languages to enhance mathematical comprehension and performance.

In the similar way, Sugiarti & Retnawati, (2019) did a study entitled "Analysis of Student Difficulties on Algebra Problem Solving in Junior High School". Investigates the challenges faced by grade 8 students in understanding algebra. The objective of the study is to identify specific difficulties students encounter in algebraic concepts and principles. The methodology employed is qualitative, utilizing a case study approach involving algebraic operations tests, open questionnaires, and documentation from 8th class students of Salam 1 Junior High School in Central Java. The findings reveal that students struggle particularly with identifying variables and constants, and applying algebraic operations such as addition, subtraction, multiplication, and division. These difficulties are linked to both conceptual misunderstandings and errors in applying mathematical principles.

Likewise, Sari, (2014) did the study entitled "An Investigation of Factors Affecting Student Performance in Algebraic Word Problem Solutions" examines what makes it difficult for students to solve algebraic word problems. The study aims to find out how well students can identify mathematical operations, understand relationships in the problems, and translate these into equations. To do this, the researcher surveyed students from different math courses and tested their problem-solving skills. The results show that the hardest part for students is translating the problem into a mathematical equation. It also found that students need strong

cognitive skills to solve these problems effectively. Differences in performance were seen between students in different grades and courses.

Aale (2012) conducted a study entitled "Mathematics Learning Difficulties of Magar Children at Primary Level." The primary goal was to examine how the cultural continuity between school and home influences mathematics learning and to identify strategies used by individuals and schools to address the learning difficulties of Magar students. This research employed a qualitative approach and a case study design, focusing on understanding the meanings and perspectives of the participants. Data collection methods included semi-structured interviews and observation forms. The study highlighted the impact of instructional language used in primary-level mathematics classrooms.

The above empirical review documents related to mathematics education had discussed the problem of multi-cultural and multi-lingual teaching and learning in our and other countries. Some studies had been focused to problems faced by the ethnic group such as Gurung, Dhanduwa Tharu, Magar and Tamangin solving verbal problems. Among these studies difficulties in learning mathematics of Limbu students in secondary level have not conducted yet. So, I had chosen this area for the study.

Theoretical review

The theoretical framework defines the key concepts of the study. A strong theoretical framework gives a sound scientific basis, demonstrates your understanding of existing knowledge on the topic, and allows the reader to evaluate guiding assumptions. It provides direction for research, allowing strongly interpreting, explaining, and generalizing from the findings. In this study, there is also some

theoretical framework review to make the study scientific basis and to make the clear guideline for the study

Lev Vygotsky's Social Constructivism Theory

This research problem is tried to describe on basis of Lev Vygotsky social constructivism theory and Socio-cultural theory. Social constructivism suggests that students collaborate to create things, while socio-cultural theory focuses on an individual's learning through group interaction. An instructional approach rooted in social constructivism, currently researched, is computer-supported collaborative learning, offering students a chance to develop 21st-century skills like communication and critical thinking. Studies also show that student discussions in class, aligned with social constructivism, have benefits. Engaging in group discussions helps students apply their classroom knowledge, enhances oral communication, and establishes a solid foundation for understanding ideas. In a constructivist classroom, learners build on previous knowledge, construct new understanding from experience, and tackle problems in real-life contexts, fostering meaningful learning.

Cultural Difference and Discontinuity Theory

Ogbu's cultural-ecological theory which focuses on minority students' responses to schooling is consisted with "cultural discontinuity" approach opening new direction to the nation of disparities as it explains minority students school performance not only through the lenses of the cultural adaption but also minority status influences. According to Ogbu's theory, there are universal difference between home and school culture that occur for all students regardless their culture background, in a sense that school favors, impersonality, individualism, universal

standard and achievement patterns whereas the family context promote interdependence among family members and intimacy.

Ogbu (2000) delineates about the cultural difference and cultural discontinuity theory. This theory deals about a problem in children's' learning when there's a gap between what they know from home and what they learn in school. Children whose home culture is similar to what's taught in school usually find it easier to learn and do better in their studies. On the other hand, children with different home cultures might struggle because they don't get much attention for what they know, and their way of learning isn't recognized as much. Ogbu (2000) highlighted two types of cultural differences i.e the primary cultural difference of voluntary minorities and the secondary cultural difference of involuntary minorities.

In examining the difficulties faced by Limbu students in solving word problems in algebra at the secondary level, the integration of social constructivism theory and cultural differences and discontinuity theory provides valuable insights. Social constructivism state that students' understanding of algebraic concepts is shaped through their interactions with teachers, peers, and educational materials within their specific cultural context. This theory highlights the importance of considering how collaborative and social learning environments impact students' problem-solving abilities. Additionally, cultural differences and discontinuity theory emphasizes the role of cultural background in shaping students' approach to mathematical problem-solving. For Limbu students, cultural factors and potential discontinuities between their native cultural practices and the educational expectations in algebra could influence their difficulties. By applying these theories, my research can explore how cultural factors and social interactions contribute to the challenges

Limbu students face in understanding and solving algebraic word problems, offering a more comprehensive view of their educational experiences and needs.

Conceptual Framework

A conceptual framework is a critical component that outlines the key concepts, variables, relationships, and theories relevant to the research topic. It serves as a theoretical foundation that guides the research and provides a structured framework for understanding, analyzing, and interpreting the study's findings.

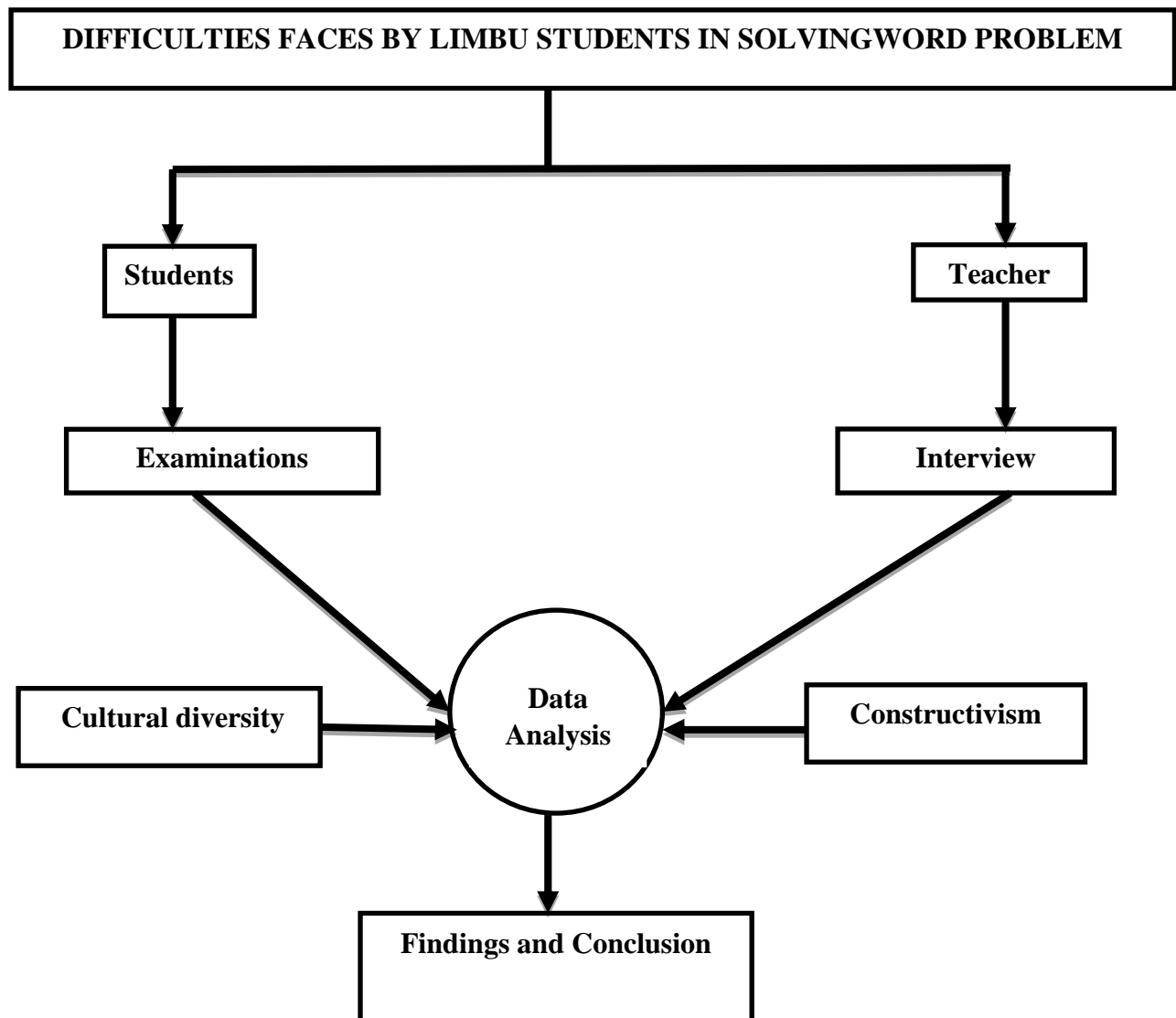


Figure:1 Conceptual framework of the study.

The whole roadmap of this research is graphically represented by the above conceptual framework. In which Limbu students and their mathematics teachers were key respondent for the primary data collection. On the basis of written examination data was collected through student respondents and interview guideline was used to collect the data from teacher respondents through interview. Qualitative data received from all the respondents were mixed and interpreted along with the social constructivism and cultural diversity theory. And data was analyzed by General inductive methods and in this way final conclusion was obtained

Chapter III

METHODS AND PROCEDURES

Methodology refers to the overall approach or strategy used to conduct a research study. It encompasses the theoretical underpinnings, research design, data collection methods, data analysis techniques, and ethical considerations that guide the research process. A well-defined methodology is essential for ensuring that the research is conducted in a rigorous, systematic, and replicable manner, and that the findings are credible and trustworthy.

Research Design

I used ethnography research design to complete this research. Ethnography is a qualitative research method that involves immersing oneself in a particular community or culture to observe and understand their behavior and interactions up close. Ethnographic research aims to provide a holistic and in-depth understanding of a culture by exploring its shared meanings, practices, and perspectives.

Ethnography is a suitable research method for this study due to its ability to provide a deep understanding of the context in which Limbu students learn mathematics, focusing on their lived experiences and perspectives, and uncovering hidden factors that may not be readily apparent through other research methods. This allows for a comprehensive understanding of the challenges faced by Limbu students and contributes to the development of culturally responsive pedagogy. Ethnography is a branch of qualitative research that enable to find the gap between home culture and school culture

Sampling Techniques

Sampling technique refers to the method used to select a subset of individuals from a larger population to represent the entire population. Sampling is an essential part of research because it allows researchers to collect data from a manageable group of individuals while still being able to make generalizations about the entire population. As my objective of the study demands, I used purposive sampling technique to select my research participants.

Sample of the study

In this research, I selected Thechambu Secondary School Taplejung district as my study site. In this school most of the students are from Limbu community. For research I selected twelve Limbu students and two mathematics teachers as the sample. In which three students were from a family that speaks both Nepali and Limbu language at their home, three students were from immigrated from city, three students were from a family that speaks only Limbu language at their home and three Students were selected whose parents are involve in social works and educated family.

Data Collection Tools

Data collection is a crucial aspect of qualitative research, as it involves gathering rich and in-depth information to understand the research question and the experiences of participants. Qualitative researchers employ a variety of data collection tools and techniques to capture the nuances of human behavior, social interactions, and cultural contexts. The data collection tool of this study were as follows

Written test. A written test is a tool of evaluation where individuals are required to respond to questions using written language which gives a clue of the level of students. It helps in analyzing students' insights on various domains of their learnings. Therefore, a test is an important factor to improve the learning process. During the study, I made a specification grid on a topic and made 15 questions based on word problems from Algebra and took a test in class IX. Firstly, I selected 12 students as sample students by purposive sampling method, and sent them out of class. Correspondingly, I took a test based on those 15 questions to the remaining students in the class, this is for per-item analysis of questions. I considered the questions' difficulty level between 30% to 70% only. Again, I shortlisted 8 questions from among those percentages. I conducted a test to those 12 sample students based on those 8 questions which had been shortlisted. In this test, I had not explained the question; I maintained a strict examination environment and students needed to figure out the questions themselves. Often, in the evaluation of a question, I found out that 8 students were unable to solve the Algebraic word problem. A second examination was conducted with eight students who were unable to solve the problems in the first attempt. In this test, I explained the question in Nepali language as well as Limbu. After both tests, I analyzed the problem behind the solution of the question and compared students' achievement on the first and second tests.

Interview guideline. Interview is an important tool to collect primary data. It is a collection procedure including the respondent by face-to-face situation. The interview schedule had developed on the basis of the accomplished objective of this study. For this study, my interview schedule consists of direct questions from two mathematics teachers about their opinions, feelings, experience, and knowledge. Firstly, I contacted two mathematics teachers for an interview, then I went to them for taking their interview separately to get primary data.

Reliability and Validity of Tools

Validity and reliability are crucial in research because they ensure that the results obtained from a test are accurate, meaningful, and trustworthy. To ensure the reliability of tool, expert judgment method was adopted. It involves gathering the opinions and insights of experts in the field to assess the test's effectiveness and ensure it accurately measures what it is intended to.

Data Collection Procedures

Data collection procedures refer to the systematic steps and methods used to gather information for a research study. These procedures are crucial for ensuring the quality, credibility, and reliability of the data collected. Well-defined data collection procedures help to minimize bias, ensure consistency, and promote transparency in the research process. At first, I prepared possible question for test and interview guideline for teachers' interview. I made sound recorder, note books etc ready. I went to selected school and explain the purpose of research with principal and subject teachers. I asked permission to collect the data. To collect the data from students, first of all I conducted written test with twelve students. Then on the basis of their achievement on written test eight students who were unable to solve the word problems were selected for next written test. I did some interaction and helped them to understand the questions. Again I conducted written test for eight students with same questions. After that I took interview with teacher. All the information was recorded carefully.

Data Analysis Procedure

This study applied thematic methods to analysis the qualitative data collected from students and teachers. Students' answer sheets obtained from written test were

studied carefully. I listed out the students' mistakes shown in their answer sheets to solve the word problem. Similarly audio data obtained from teacher interview was transcribed and meticulously examined for key phrases and concepts that hold the essence of their experiences. The causes of inability to solve word problem was found on the basis of teachers' interview. On the basis of causes of inability to solve word problem shared by teachers and mistake found in student solving process, I made four themes. These themes were reading and language difficulties, difficulties on conceptual understanding, difficulties on transformation and difficulties on solving process. Furthermore, the lens of social constructivism and cultural diversity guided the interpretation of these themes, acknowledging the dynamic interplay between individuals and their social contexts in shaping their understanding of the educational journey. To bolster the robustness of the findings, data triangulation was employed, weaving together the diverse viewpoints of students and teachers to create a richer and more nuanced picture. Finally, the emergent themes were situated within the broader context of existing literature, with both the strengths and limitations of the study openly discussed. This comprehensive analysis ultimately aims to generate valuable insights for all stakeholders involved in the educational process, paving the way for future research and informed action towards a more enriching and equitable learning environment.

Ethical Consideration

If any kind of research involves the person, special attention should be paid to the person's rights, dignity, freedom, and privacy (Khanal, 2019). The ethical considerations of my study where I observed the classroom only after getting the permission with authority of the school and subject teacher of related school, interviews was conducted only after giving all the prior information to the participants

about the study and getting their approval, data won't collect for my personal gain and my personal benefit, respecting the diversity in school the data was collected in a biased manner, comfortable language were used in the data collection process for easily understandable to the participants, and in case of publishing last name & address of participants in the statistics was only with their approval.

Chapter IV

Analysis of data and interpretation of result

Analysis of data and interpretation of results are critical components of any research study or experiment. Once data has been collected, it must be carefully analyzed to draw meaningful conclusions. This typically involves organizing, summarizing, and statistically analyzing the data to identify patterns, trends, or relationships. Interpretation of the results requires careful consideration of the findings in relation to the research question

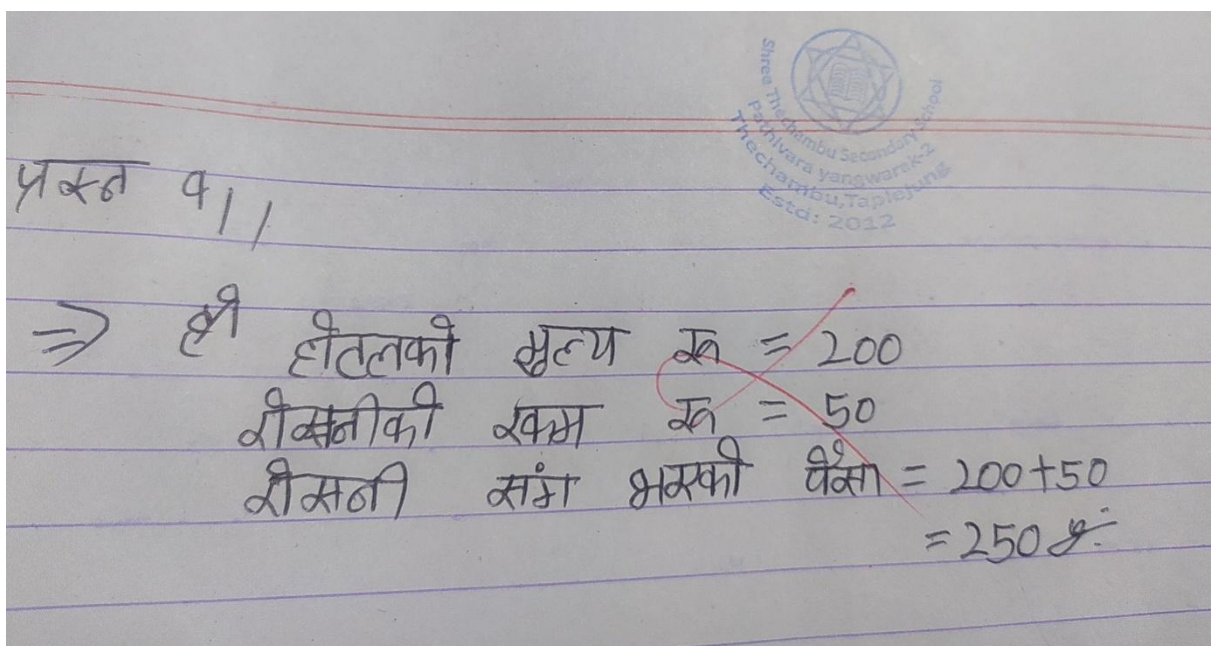
This chapter includes analysis and interpretation of the data. The data were collected from 12 students of grade IX by written test which were conducted twice earlier. From first test, answer sheets were checked carefully and calculated their obtain marks and determined their achievements. It was found that the score of first test was very low, but in second test after I explained questions ,the average marks of students was improved as compare to first test.I also had interviewed with two mathematic teachers. The obtained data were calculated and analyzed according to the objectives of this study. Thus the obtained data were analyzed and interpreted under different themes which are as follows:

Reading and language difficulties

Reading and language difficulties can pose significant challenges when it comes to understanding word problems in algebra. These problems often involve translating verbal descriptions into mathematical expressions or equations, which can

be particularly challenging for individuals with reading difficulties or language barriers. Reading refers the ability to identify and understand the symbol, mathematical term and sequences used in a problem

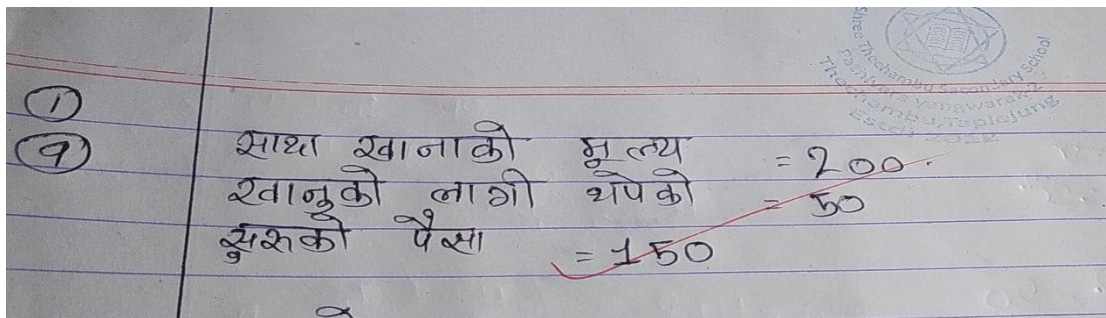
In the first test, the questions were not explained before examination then only four students able to solved the word problem. One of my student respondents S₁ solved the question “In a hotel the cost of simple meal is Rs 200. If Roshani add Rs 50 to her initial money she can eat a simple meal. Find Roshani's initial money?” as



This solution shows that the student don't understand question properly. They wrote the cost of hotel instead of cost of simple meal. They find total money of Roshanias answer but questions demands Roshani's initial's money. According to above result, I concluded that some of the students cannot understand word problems and not able to identified what is given in the question. This is because of careless reading of question and lack of understanding level of students.

In second test I explain the question according to students nee. Questions for the second test were also same as the questions of first test. The result of second test

was improved than that of first test. One of student respondents S_2 solve above problem as



Answer sheets of respondent S_2 shows that he understands the questions but lack of skill to translate words to algebraic equations. The reason behind lack of skill to translate equation was difficulties on assuming variable and transformation word to algebraic expression.

The results of the two tests show that students struggled to understand the questions. They had difficulties with reading and have language error, most of the students couldn't solve the problems without an explanation. However, once the questions were explained in a way that suited them, many students were able to solve the problems. This indicates that they can solve algebraic problems but face challenges with word problems due to a lack of understanding, reading, and language skills.

Students performed better on the second test after the questions were explained to them. This matches Binod's (2022) idea that culture strongly affects how well students do in math. Ogbu's theory says that voluntary minorities, like immigrants who chose to move to a new country, tend to learn more effectively. Putting all this together, it seems that understanding questions better and cultural background both help students, especially voluntary minorities, do well in school.

To find the causes of difficulties in solving word problem, the participated teacher T₁ explain his view as "Algebraic word problem is one of the difficulties problem, its vocabulary terms, and language is not learnt too easily. Many students are unable to understand difficult terms in algebra word problem".

From the above narratives of teacher, what I feel that Understanding mathematics problems can be really hard for some students. When we read a word problem, the words are very important. The main reason for teaching algebra word problems is to help students understand what the problem is really saying. If you're not good with words, solving words problems can feel almost impossible. So, math teachers should help students get better at understanding language. A study by Gooding (2009) showed that students have trouble with the words and symbols in math problems because of reading level issues and understanding what the problem is asking. Teachers can help by explaining things clearly and encouraging students to put problems into their own words. It's also important to teach students to really understand what they're reading when solving a problem.

In solving another problem "There is a natural number and Sum of the number and its square is 30 and difference is -20, find that number?". In this problem many more students committed assuming variable mistake. One of my student respondent S₃ solved the above question like this.

एक प्राकृतिक संख्या = a
 अर्क प्राकृतिक संख्या = b
 प्रश्न अनुसार
 $a + b = 30$
 $a - b = -20$
 10

Above solution shows that students can't understand the questions properly. They assume a natural number 'a' which is correct but they assume square of same natural number is 'b²' which is incorrect. They only remember calculating steps without knowing rule. I conclude that students were careless while reading the questions and weak in language vocabulary, lack of knowledge to solve algebraic equations.

In second test I explain questions according to student's needs. Same problem and eight students who were unable to solve word problem in first test were enrolled for second test. The result of second test was improved than first test. The respondent student s₃ solved above problem like this

2. मानिए प्राकृतिक संख्या = x
 एक संख्या वर्ग = x^2
 पहिले सर्त अनुसार, $x + x^2 = 30$
 दोसरी सर्त हिसाब गर्की, $x - x^2 = 20$

$$\begin{array}{r} x + x^2 = 30 \\ x - x^2 = 20 \\ \hline 2x + 0 = +10 \\ 2x = +10 \\ x = 5 \end{array}$$

यही संख्या = 5

Analyzing above two test students can't solve word problem in first test due to language difficulties and lack of proper explanation.

To find the concept of language difficulties solving word problem, participated teacher T₂ explain his view as "*Algebra word problems can be tricky because they often use hard words and concepts that aren't easy to learn. Lots of students struggle to understand these tough words in algebra problems, which makes learning them not so simple.*"

From the view of teacher I found that word problems of algebra can be hard for students because they often use difficult words and complex ideas. Many students

struggle to understand these tough words, which makes it challenging to learn and solve the problems. This suggests that the language used in algebra problems can be a big barrier to learning, and it's important to consider how this affects students, especially those from different cultural backgrounds like Limbu students. He mentioned that the ninth-grade students had transitioned from elementary schools where they primarily communicated in their mother tongue. Most teachers at these elementary schools were local. However, in high school, the majority of the teachers are not local and used only the Nepali language for instruction. Some students came from families that spoke only Limbu. While these students could read Nepali, they struggled to fully understand the language. Although they could perform mathematical operations, they had difficulty formulating correct equations.

This is referential to state that understanding problem is one of the major learning difficulties among students with reference to language ability and ability to meaning making with mathematical terms and symbols. The languages used in word problems are the first steps to understand the problem. The main concern of teaching word problems in algebra is to make meaning from the problem. In short, without developing language ability, the learning algebraic word problem is seen almost impossible. Mathematics teachers need to focus on making students learn language in order to be proficient in solving algebraic word problems. This can be linked with the study of (Gooding, 2009) that student unable to understand the words and symbols such as the reading level difficulties, the difficulties related to the reading of the given problem and students ability to read the symbols, mathematical term and sentences that use in the problem. This problem can be addressed with the solutions of Cruz and Mine (2014) that the cause of language difficulties with explanation and weak word skill, the student have difficulty in understanding written or verbal direction or

explanations and find out word problem especially difficulty to translate. It was also found that students had mathematical vocabulary problems and also forgetting very fast. In language problem in algebra, teacher could encourage students to put problems into own words. Teach students to read for meaning when trying to identify the operation to use for solving problem".

According to Seifi et al. (2012) findings which illustrates 39% of student's problems with math word questions were due to lack of understanding to the questions. This closely resembles findings on the test I have conducted. This idea also fits with Lev Vygotsky's theory of the Zone of Proximal Development (ZPD), which says students learn better with guidance. Putting these together, it's clear that explaining questions and providing support help students understand better and do better in math.

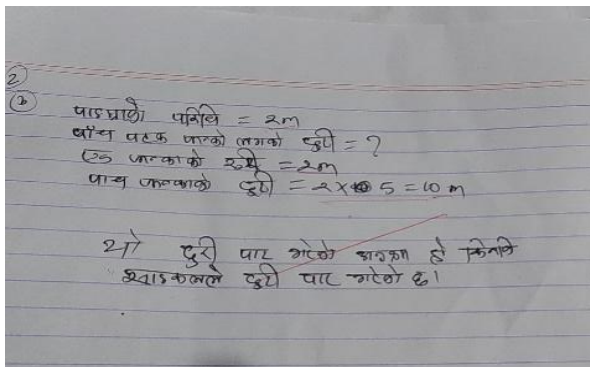
Difficulties on Conceptual understanding.

A mathematical concept is a construct in mind that has collection of meanings and is associated with a set of words used in mathematics. Cangelosi, (1996) states that a concept is a category student's mentally construct by creating a class of specifics possessing a common set of characteristics. The process, by which creation qualities of actual objects or events are internalized as concepts while other qualities are ignored, it called abstraction. Thus a concept can be described as an abstract meaning, mental picture or idea that an individual has about something. Conceptual knowledge consists of connected relationships between idea and concepts internalized by individuals. Researchers analyzed the conceptual level difficulties on the basis of two categories. First, if the students can understand the problem their own it is

considered as no conceptual difficulties. Second, if the students are unable to what they are trying to find out it is considered as conceptual difficulties.

Another understanding level of problem was given to students and that problem was “If the circumference of the wheel of a bicycle is 2m. Make a sequence of distances travelled by first five regular turn of wheel, what kind of sequence is it and why?”

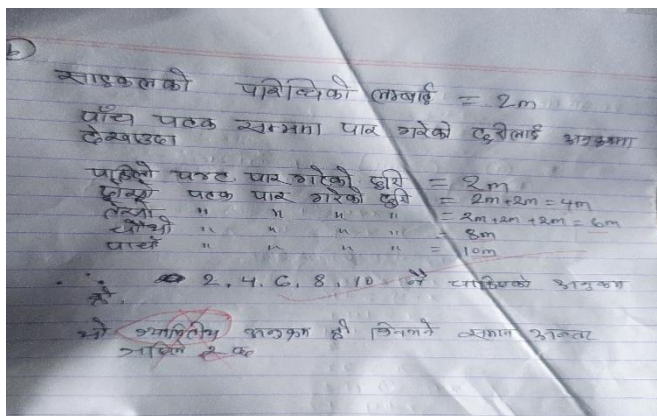
In first test without explaining the questions many students faced difficulties to understand the problems. One of student respondent s_4 solved above questions like this



The above solution shows the conceptual difficulties faced by students based on their work. In discussing the process, it becomes evident that the students did not attempt to make meaning of the problem. The meaning-making process is hindered by the conceptual terms used in the questions. For these problems, students began solving without understanding the question, indicating they attempted to solve the problem without a clear concept. For instance, students incorrectly tried to find the distance traveled by the wheel in five turns. The correct approach is to find the

distance traveled in each turn of the wheel and create a sequence. For example, the distance traveled by the first turn is 2m, the second turn is 4m, the third turn is 6m, the fourth turn is 8m, and the fifth turn is 10m. This forms the sequence 2, 4, 6, 8, 10. Finally, they need to define the type of sequence and provide a reason for their classification.

The result of second test was improved than that of first test. Maximum number of student's get clear concept and many students get correct answer but few of them still made a mistake at ending steps. Student respondent S_4 solve above question like this.



After explaining the question, above solution shows that conceptual difficulties were solve but an ending step students confuse about arithmetic and geometric sequence student's gives reason of arithmetic sequence defining geometric series. Above two tests I conclude that due to lack of vocabulary, lack of confident lack of proper explanation, students cannot solve word problem properly.

To find the causes of conceptual understanding difficulties in solving word problem participated teacher T_2 express his view as "*Many students lack prior knowledge in algebra, struggle with vocabulary, and encounter unfamiliar variables*"

From the view of participated teacher T₂, I found that many students find algebra difficult because they don't have enough background knowledge, struggle with the specific words used, and face confusion with unfamiliar variables. These issues make it hard for them to understand and solve algebra problems. Addressing these challenges can help improve their learning and success in algebra.

To find the idea to teach students easier way to understand, participated teacher T₁ express his view *"First, the teacher should start by building on what students already know. Then, they'll explain what the problem is asking and what they need to figure out."* Again he added *"We divide students into groups based on what they already know, how well they can read and write. We need to pay extra attention to the lower group and spend more time with them."*

From the view of participated teacher T₁, I found that the value pre knowledge that help them to connect new information to their existing knowledge. Teachers need to clearly explain what the problems are asking and what students need to find out. Grouping students based on their knowledge and reading skills allows for better support, with extra attention given to those who struggle the most. This method shows the importance of using different teaching strategies to help all students improve their understanding and problem-solving skills in algebra.

From the above result I conclude that difficulties behinds to conceptual understanding were careless reading, lack of pre knowledge, language barrel and proper explanation of question.

Transformation difficulties

The transformation difficulties refer to problems students have when they can't turn a word problem into a math equation or choose the right math operation. Cruz

and Mine, (2014) research shows that, Students difficulties to transformation word problem due to misinterpretation, unable to visualization of the problem and other describe as the above mentioned problem.

For correct transformation every student should read carefully to the question Take time to understand the problem statement thoroughly. Identify key information such as quantities, relationships, and what needs to be found. After that define variables assign variables to unknown quantities. And last translate words into math using below keywords to translate sentences into equations where is, are, was, were: indicates equality ($=$) . more than, less than: indicates inequality ($>$, $<$).sum, total, altogether indicates addition ($+$)difference, less indicates subtraction ($-$).product, times, indicates multiplication (\times) quotient, divided by indicates division (\div).This are essential pre knowledge of transforming words to algebraic equation.

Another transformation problem was given to students and that problem was *Raju and Hari have to divide 3 banana, show an equation of the bananas they would get by letting x and y*

In first test without explaining the question many students faced proper placement of mathematical symbol. Student respondent S_5 solve the above question like this.

\Rightarrow राजुकी भाटा = x
 हरीकी भाटा = y
 प्रकृत अंशकां
 ~~$x \div y =$~~ $x \div y = 3$

From above test paper they misinterpretation of the Problem Statement $x \div y = 3$ means $\frac{x}{y} = 3$. The problem asks for an equation representing the total division of 3 bananas between Raju and Hari. The equation $\frac{x}{y} = 3$ addresses a ratio rather than the total division. The focus should be on dividing the 3 bananas in total, not on the ratio between the portions.

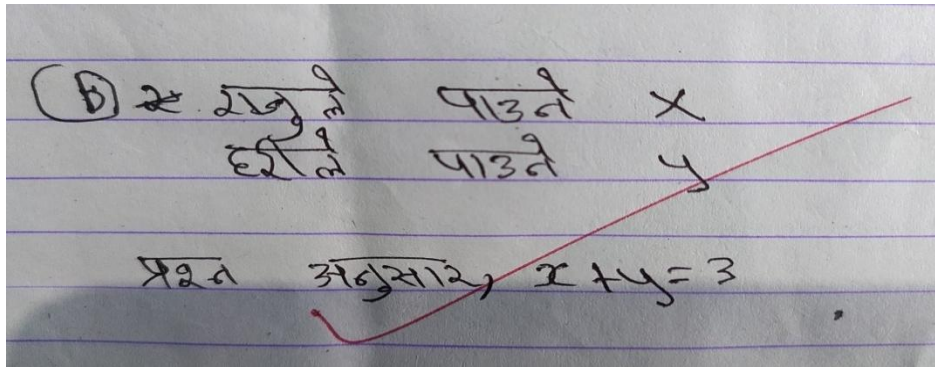
Another problem is lack of Total Sum Equation: The problem's requirement to divide 3 bananas is not reflected in $\frac{x}{y} = 3$. The equation $X + Y = 3$ is essential because it ensures that the total number of bananas distributed between Raju and Hari is exactly 3. This total sum constraint is missing in the provided answer.

For the second test where teacher explain the question according to students need. The result of second test was improved than first test. Many students solve the above problem but some student still feel difficult. Student respondent s_6 solve above question like this

b) राजूकी भाग = x
 हरीकी भाग = y
 जम्मा केरा = 3
 $3 = (x+y)$

Answer sheet of respondent S_6 shows that they Misunderstood the Problem. The question asks for an equation that shows how 3 bananas are divided between Raju and Hari, but the answer $\frac{3}{x+y}$ doesn't make sense in this context. The correct approach is to show how the total number of bananas (3) is split between them.

The answer sheet of students respondent s_5 after second test with correct answer was given below



Researcher found reason behind transformation difficulties on Limbu students are weak in reading capacity, weak in linguistic accuracy, weak in concept making and weak in mathematical symbol and terminology, Misinterpretation, lack of clarity and over thinking .

To find the causes of difficulties in transforming word problem, the participated teacher T₂ express his view as “*Students who are good families send them to the city to study and parents who don't care about their children so much make their children work instead of studying, so there are many problems not only in transformation but in all mathematics.*”

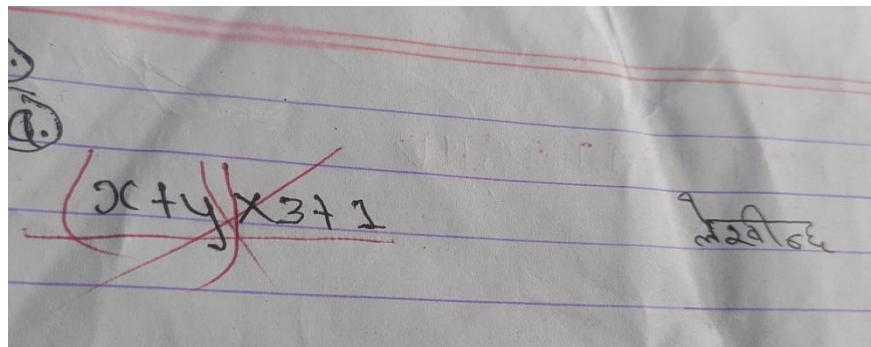
From the view of participant teacher T₁, I found that many students struggle with transformations in mathematics, among other math topics, due to differences in family support and socio-economic conditions. Students from families who value education and have the means often send their children to city schools, where they receive better educational resources and instruction. Conversely, children from less supportive or economically disadvantaged backgrounds may be required to work instead of focusing on their studies. This situation deprives them of the time and energy needed for academic learning. As a result, these students face numerous challenges, not just with transformations but across all areas of mathematics. The disparity in educational opportunities and parental support leads to significant gaps in mathematical understanding and skills.

To find the solution of transformation difficulties, participated teacher T_1 express his view as “*first of all we have to recognized level of each student after knowing level of student we have to divide in needed group after that we run an improvement class with suitable teacher*”

From the view of participant teacher T_1 , I found that there is a three-step approach for helping students: first, identify each student's skill level; second, group students based on their needs and third, run special improvement classes with the right teachers for each group. This method aims to provide targeted support to help all students improve.

Another question related to the transformation difficulties was “*Write the expression in algebraic form where more than one of three time of sum of two positive numbers*”.

In first test without explaining the question students face difficulties in order of operation. The answer sheet of student respondent s_7 was given below .



From above answer sheet shows that student s_7 did incorrect order of operations the expression $x+y \times 3+1$ suggests that x and y should be summed first, then multiplied by 3, and finally added by 1. However, according to the order of operations (BODMAS), multiplication should be performed before addition. Therefore, the correct interpretation of "three times the sum of two positive numbers" would be $3 \times (x + y)$.

The first reason behind the error for above test was order operation misunderstanding. Students may not fully grasp the correct sequence of operations in algebraic expressions, leading to errors in how they interpret and write down expressions, second reason lack of clarity in problem understanding and third reason was limited familiarity with algebraic notations

For the second test where teacher explain the question according to students need. That test was taken same questions and same students where all students get the correct equations and the answer sheet of correct transformation is given below

Handwritten mathematical expression on lined paper: $(x+y) \times 3 + 1$. To the left of the expression are circled numbers 3 and 2. To the right of the expression is the Hindi text "मिडल टैप".

From the above test researcher conclude that students misunderstood the question and reason behind misunderstanding the question was ambiguous language, overgeneralization, miscommunication and lack of familiarity etc.

To find the causes transformation difficulties on solving word problem, participated teacher T₂ express his view as "*Students commit the transformation difficulties because student focuses on only calculation part, lack of pre-requisite knowledge of their previous lesson.*"

From the view of participant teacher T₂, I found that Students often struggle with transformations in math because they focus too much on doing calculations without really understanding why they're doing them. This lack of understanding can make it hard for them to apply transformation concepts correctly. Also, if they haven't

fully learned basic math skills like geometry or algebra, they might find it difficult to grasp how shapes change under different transformations. While these factors are important, it's also crucial to consider how teaching methods, individual learning styles, and how engaged students are in their learning can affect their ability to understand transformations. To help students succeed, teachers should balance teaching how to do calculations with explaining why those calculations work, so students can use math confidently in different situations.

Again, To find the causes of transformation difficulties on solving word problem, participated teacher T₁ express his view as "*Because of lack of mathematical concept, skills and more emphasis on calculation part, unable to understand the connection between word and mathematical symbol, lack of meaning of the each mathematical term in difficulties read and unable to identify the correct operation to solve the problem.*"

From the view of participant teacher T₁, I found that Understanding mathematical concepts and developing strong skills are crucial for connecting words to mathematical symbols effectively. Emphasizing calculations without grasping the underlying concepts can hinder this connection, making it challenging to interpret and solve problems correctly. Each mathematical term carries specific meaning, and without a clear understanding, students may struggle to identify the appropriate operations needed for problem-solving. Building a solid foundation in mathematical concepts, skills, and terminology helps students read problems accurately and apply the correct operations with confidence. Similarly Cruz & Mine (2014) investigated the challenges students face with transformations. They found that students struggle because they have difficulty visualizing problems, swapping values and mathematical terms, and using the right operations.

Based on the above results, it can be concluded that the accurate placement of mathematical symbols and the sequence of mathematical operations are the primary factors influencing difficulties in transformations.

Difficulties on solving process

Difficulties in the solving process refer to challenges students face when they use the wrong method, formula, or make calculation errors, preventing them from solving problems accurately. This type of difficulty arises when students recognize the correct operation but struggle with the steps needed to execute it correctly. Researchers observed that students often knew the right approach to solve problems but failed to carry out the steps accurately when analyzing their solutions. According to (Jupri et al., 2014) The solving process in mathematics involves a series of steps to find the solution to a problem. it includes a sequence of understanding the problem, identifying what is known and unknown, selecting the right approach, setting up the equation or strategy, performing calculations and checking the solution

The question that related to the difficulties on solving process was as follows
“The result of a fraction multiplying its numerator by 4 and subtracting 2 from denominator becomes 2. The result becomes $\frac{9}{7}$ if 15 is added on the numerator and 2 is subtracted from two times of the denominator. Find the fraction:”

The first attempts of the sample students without the teacher explain as there problem was as follows.

(C) माना $x+y$ किस्तका हट र. उकाहल
 प्रश्न अनुसार,

$$\frac{x \times 4}{y-2} = 2$$

$$4x = 2y - 4$$

$$x = \frac{2y-4}{4} \quad (2)$$

$$x = \frac{y-1}{2} \quad (7)$$

फिर

$$\frac{x+15}{2y-2} = \frac{9}{7}$$

$$\text{or, } 7x - 105 = 18y - 18$$

यदि (1) गट

$$7 \left(\frac{y-1}{2} \right) - 105 = 18y - 18$$

$$7y - 7 - 210 = 36y - 36$$

$$36y - 7y = 36 - 210$$

$$29y = -174$$

$$y = \frac{-174}{29}$$

From the above answer sheet students have good conceptual understanding they transformed word to algebraic correctly but in first case third step while taking common made error and all problems become wrong. Reason behind those mistake students were careless, panic, try to steps jump etc.

In second test after explaining questions. The test was improved than first test many students try to make equation and few students get correct answer. Those students they can't solve the problem faces difficulties like understanding the problem, setting the equation and solving the equation. Reason behind those difficulties were lack of pre knowledge, Lack of linguistic competence and lack of regular practice at home.

Moreover, to further understand the challenges students face in the solving process for this problem, the researcher conducted face-to-face interviews with teachers involved in addressing these issues. Initially, To find the causes of

difficulties of solving process, participated teacher T₂ express as , "*Students often prioritize the outcome over understanding the process.*"

The responses of the teacher reveals that many students focus on getting the right answer rather than understanding the steps and concepts involved in solving the problem. This approach can limit deep learning and critical thinking, as it may lead to a shallow understanding of the material. Encouraging students to value the problem-solving process more than just the correct answer can help them develop a better understanding and mastery of the subject.

To find way of solution on solving process difficulties, participant teacher T₁ express as "*I begin by clearly explaining the problem and its key features. Then, I provide necessary background knowledge and step-by-step methods for solving the problem, ensuring to explain each step thoroughly.*"

The teacher's responses reveal the importance of a systematic teaching strategy. This entails outlining the issue and its salient aspects in detail at first, then giving the relevant background information. Students are better able to understand the problem and grow in confidence and problem-solving abilities when the problem is broken down into step-by-step approaches and each step is explained in detail. Prior to trying to answer the problem independently, this methodical technique guarantees that students have a firm grasp of the material.

McCall (1999) found that if students can convert problems into mathematical form but can't use the right mathematical operation, it means they have trouble with the solving process. The main reasons for these difficulties are students' inability to perform the correct calculations, a lack of basic math concepts, not knowing how to

multiply variables, and an overall inability to do the right mathematical operations. This indicates that the students are facing solving process difficulties.

Additionally, students often show carelessness in math class, do not pay attention to what is taught, and do not practice at home. McCall (1999) mentioned that students struggle with the solving process due to issues like computation difficulties, incorrect operations, problems with regrouping, and being unaware of formats or patterns. These difficulties are often tied to a lack of basic mathematical concepts. Interviews math teachers revealed that students' inability to perform correct calculations, lack of knowledge in multiplying variables, not practicing math at home and prioritizing the end result over the process contribute to their problem-solving difficulties.

Due to carelessness in class, lack of practice, lack of basic mathematical concepts, lack of prior knowledge, and errors in mathematical operations, students experience difficulties in the solving process.

Chapter IV

Findings, Conclusions, Implications and Recommendations

This chapter addresses the findings, conclusions, implications, and recommendations of the study. The first section provides a summary and highlights the major findings. Following the analysis and interpretation of the collected data, key conclusions are drawn in the second section. Finally, the chapter presents several implications and recommendations based on these conclusions.

Summary of the study

This thesis explores the difficulties that Limbu students face when solving mathematical word problems at the secondary level. The study uses Lev Vygotsky's Social Constructivism Theory to understand how language, culture, and social interactions impact their learning. The research involved written examination and interviews to collect the data from students and teachers respectively. It was found that Limbu students often hesitate to participate in class due to cultural reasons, which affects their learning. At home, these students learn by observing and doing, which is different from the listening-based learning in schools.

Findings of the Study

The study found several important points about the challenges faced by Limbu students in solving mathematical word problems such as misinterpretation, incorrect order of operations, and weak reading and language skills. Despite these, the major findings of the study are as

- Many Limbu students struggled with understanding and interpreting word problems due to language difficulties. The use of Nepali, which is not their mother tongue, posed a significant challenge.
- Cultural factors influenced the learning styles and classroom participation of Limbu students. At home, these students learn through observation and hands-on activities, which contrasts with the more verbal and instructional approach used in schools.
- After receiving targeted support and explanations from teachers, students' performance showed marked improvement. Comprehension and performance in algebraic word problems are significantly enhanced with proper guidance.
- Limbu students exhibited hesitation to interact with peers and teachers due to socio-cultural reasons. This hesitation hindered their classroom participation and learning, further impacting their ability to solve word problems.
- The findings suggest that incorporating the cultural and linguistic backgrounds of Limbu students into teaching methods can enhance their understanding and performance in mathematics. Teachers need to be aware of these factors and adapt their instructional strategies accordingly.
- Students struggled with understanding the language and vocabulary used in word problems. Students often made errors in the solving process despite understanding the problem conceptually.
- After explaining questions, students showed better performance, but some still faced challenges in translating words into mathematical expressions, lack of step-by-step process understanding, and prioritizing the correct answer over the process.

- Cultural background and family support significantly affect students' performance. Students from supportive backgrounds performed better due to better resources and encouragement.

Conclusion of the Study

As a researcher, I concluded that the difficulties faced by Limbu students in solving mathematical word problems are multifaceted and deeply intertwined with language and cultural barriers. These students, whose first language is not Nepali, often struggle with comprehension of word problems written in Nepali, leading to misunderstandings and incorrect solutions. The linguistic difficulties are compounded by cultural differences in learning styles. At home, Limbu students engage in learning through observation and participation, which contrasts sharply with the school environment that relies heavily on verbal communication and listening skills. This mismatch exacerbates their difficulties in fully participating and succeeding in classroom activities.

In addition to language and cultural barriers, Limbu students also exhibited challenges in understanding mathematical concepts and translating word problems into mathematical expressions. Misinterpretations and computational errors were common, highlighting the need for more focused support in both language and mathematical reasoning. This study underscores the importance of targeted instruction in problem translation techniques and the necessity for teachers to provide clear, step-by-step explanations to bridge these gaps. The findings suggest that without addressing these specific needs, Limbu students are likely to continue facing significant obstacles in their mathematical education. The study emphasizes the critical role of culturally responsive teaching methods in improving the educational

outcomes of Limbu students. When teachers adapted their instructional approaches to provide additional support and explanations, students showed notable improvement in their performance. This demonstrates that understanding and integrating students' cultural backgrounds into teaching practices is essential for fostering an inclusive and supportive learning environment. By recognizing and respecting linguistic and cultural diversity, educators can help Limbu students overcome their challenges and achieve better outcomes in mathematics, ultimately contributing to a more equitable educational system.

Implications of the Study

The findings of this study have several important implications for the educational system, particularly in addressing the challenges faced by Limbu students in solving mathematical word problems. First, there is a clear need for language support in the classroom to bridge the gap between students' mother tongue and the language of instruction. This could involve bilingual education programs, the inclusion of instructional materials in both languages, and training teachers to be more aware of linguistic challenges. By acknowledging and addressing the language barrier, schools can create a more inclusive learning environment that supports all students, regardless of their linguistic background.

The study highlights the importance of culturally responsive teaching methods. Teachers should be trained to recognize and incorporate the cultural contexts of their students into their teaching practices. This could involve using culturally relevant examples in word problems and fostering an inclusive classroom environment that respects and values diverse cultural backgrounds. Additionally, involving the community and parents in the educational process can help reinforce the

learning at home and provide a supportive network for students. These steps can help create a more equitable education system that not only improves academic outcomes but also enhances the overall learning experience for minority students like those from the Limbu community.

Recommendations for further Study

Due to the lack of infrastructure and time this thesis could not cover all sector comprehensively. This study focused on difficulties faced by Limbu students in solving word problem of algebra at secondary level mathematics. Therefore I recommended that future studies explore sectors. By examining these areas in more details researchers can give a better understanding and provide more comprehensive insights into the subject.

- Conduct long-term research to assess the effectiveness of bilingual education programs and language support interventions on the mathematical performance of Limbu students. This will help determine the sustainability and impact of these programs over time.
- Investigate the mathematical problem-solving challenges and educational experiences of students from other indigenous and minority groups in Nepal. Comparing these findings with those of Limbu students can provide broader insights into common barriers and effective strategies.
- Investigate the potential of integrating technology, such as educational software and interactive tools, to support the learning of mathematical concepts among Limbu students. This study can explore how technology can bridge language barriers and make learning more accessible and engaging.

- Study the effects of increased parental involvement on the academic performance of Limbu students, particularly in mathematics. Research can focus on identifying the most effective ways to engage parents in the educational process and how this involvement translates into student success.

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Appendix A

DIFFICULTIES FACED BY LIMBU STUDENTS IN SOLVING WORD PROBLEM OF ALGEBRA AT SECONDARY LEVEL

Specification grid

Class: 9

Sub: mathematics

s. n	Areas	Total worki ng hour	Knowledge		Understandi ng		Application		Higher ability		Total num ber of item	Total numbe r of questi ons	Tota l Mar ks
			Num ber of item	mar ks	Num ber of item	mar ks	Num ber of item	mar ks	Num ber of item	Mar ks			
1	Alge bra	28	2	2	2	4	3	7	1	2	8	3	15

Appendix B

Questions for written examination

1.a. एक छाक सादा खानाको मुल्य रु 200 पर्छ यदि रोसनिले रु 50 थपिन भने एक छाक सादा खान सक्छिन ।

रोसनिसंग सुरुमा भएको पैसा पता लगाउ ।

the cost of simple meal is Rs 200. If Roshani add Rs 50 to her initial money she can eat that simple meal. Find Roshani's initial money?1

b. राजु र हरिले 3 वटा केरा बाड्नु छ उनिहरुले पाउने केरालाइ x र y मानी समिकरणमा देखाउ।2

(Raju and Hari have to divide 3 banana, show an equation of the bananas they will get by letting x and y)

c. एउटा भिन्नको अड्सलाई 4 ले गुणन गरि हरबाट 2 घटाउदा नतिजा 2 हुन्छ। यदि सो भिन्नको अड्समा 15 जोडि हरको दोब्बर बाट 2 घटाइयो भने नतिजा 9/7 हुन्छ भने सो भिन्न पता लगाउ । 2

denominator becomes 2. The result becomes 9/7 if 15 is added on the numerator and 2 is subtracted from two times of the The result of a fraction multiplying its numerator by 4 and subtracting 2 from denominator. Find the fraction:

2.

a. कुनै एउटा प्राकृतिक सङ्ख्या छ त्यो सङ्ख्या र त्यसको वर्ग को योगफल 30 र फरक -20 हुन्छ भने त्यो सङ्ख्या पता लगाउ।1

(There is a natural number and Sum of the number and its square is 30 and difference is -20, find that number?)

b. एउटा साइकल को पाङ्ग्राको परिधिको लम्बाइ 2m छ र उक्त पाङ्ग्राले प्रत्येक 5 पटक फन्को लगाउदै जादा पार गर्दै जाने दुरिहरुको अनुक्रम बनाउ तयो कुन खाले अनुक्रम होर किन?2

(If the circumference of the wheel of a bicycle is 2m. make a sequence of distances travelled by first five regular turn of wheel, what kind of sequence is it and why?)

c. अङ्कगणितिय अनुक्रम 2,6,10,14,18,.....को n औ पद निकाली 20 औ पद पता लगाउ । 2

(Find the nth term and 20th term of Arithmetic sequence 2,6,10,14,18,..)

3.

a. दुई धनात्मक सङ्ख्या x र y को योगफलको 3गुणा भन्दा 1 ले बढिलाइ कसरी लेखिन्छ । 2

Write the expression in algebraic form where more than one of three time of sum of two positive numbers .

b. दुइवटा धनात्मक सङ्ख्याको योगफल 128 र तिनिहरुको फरक 16 छ भने ती सङ्ख्याहरु पता लगाउनु होस । 3

(If the sum of two positive numbers is 128 and their difference is 16, find those numbers.)

Appendix C

Interview guideline

- Teachers name.....
- Experience of teachers in teaching diverse mathematics classroom
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.....
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.....
- Strategies used to maintain Equality and equity in your class
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- Problems in teaching due to diversity in culture, tribe & language.....
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- Language used in classroom.....
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- Difficulties faced by students due to language
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- Understanding level

of students.....
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.....
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- Transformation difficulties to solve mathematical problems

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- Difficulties in the process of solving problems

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