

Mother Tongue Instruction and Foundational Mathematics Achievement: A Case Study of Primary Schools in Bara

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Abstract

In Nepal, Mother Tongue-Based Multilingual Education (MTB-MLE) is recognized as a crucial strategy for promoting inclusive and equitable early learning. As national policies encourage using students' first languages in early grades, their practical effects on learning basic subjects like mathematics remain underexplored, especially in linguistically diverse areas like the Bara District. This qualitative study examines how the mother tongue—primarily Bhojpuri—affects teaching and learning of foundational mathematics in two public primary schools in Bara. Data were gathered through semi-structured interviews with six students, three primary teachers, classroom observations, and two headmasters. Although Nepali is the official medium of instruction, Bhojpuri predominantly shapes students' linguistic environment. Thematic analysis showed that teaching in the mother tongue improved conceptual understanding, classroom engagement, and student participation. Similarly, it increased confidence among students when solving problems or asking questions, and better peer collaboration, especially when culturally relevant examples were used. These results suggest that mother tongue instruction fosters a supportive cognitive and emotional environment for learning mathematics. The study highlights the need for context-specific policies, locally developed teaching resources, and targeted teacher training to effectively implement MTB-MLE.

Keywords: Mother tongue instruction, MTB-MLE, foundational mathematics, qualitative study, primary education

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Introduction

Language of instruction is critical in determining the cognitive, emotional, and academic growth of children, especially in the initial years of school. Language as a means of communication is also a tool of thinking and learning when abstract thought, problem solving, and symbolic understanding are important, such as in mathematics. The discrepancy between the language of instruction and the language of the home in a highly multilingual country such as Nepal, where over 124 languages are spoken (Central Bureau of Statistics, 2021), poses major challenges to fruitful learning (Dhakal, 2021). Such linguistic diversity can be directly observed all over Nepal, including Bara District, where Bhojpuri, Maithili, and Tharu are spoken in

the region, and where most formal learning activities are held in Nepali or English.

Although the Constitution of Nepal acknowledges the rights to linguistic diversity and getting an education in one of the native languages, the Mother Tongue-Based Multilingual Education (MTB-MLE) framework is not properly implemented. The Ministry of Education implemented MTB-MLE through the School Sector Reform Plan (SSRP) in 2009 to counter the educational marginalization of indigenous and ethnolinguistic groups (Ministry of Education, 2009). The policy encourages early-grade instruction in the first languages of students, and it coincides with pedagogical scientific opinions across the world that rely on the foreign language gain in cognitive development and learning results as long as the students can be taught in a language they have been familiarized with (Ball, 2011;

UNICEF, 2019). Theoretically, the strategy promotes effective learning, confirms students' linguistic identities, and promotes inclusive learning systems (Tamang, 2024).

Especially in Nepal, the incorporation of MTB-MLE into subject-specific teaching, especially mathematics, has not been adequately practiced. Literature has mainly been concentrated in either general literacy or language policy, depriving us of valuable insights about the role of mother tongue instruction in affecting learning in content-rich themes such as mathematics (Dhakal, 2021). This is an untouched opportunity, as global studies have indicated the ability of culturally-sensitive teaching using the first language to aid greater conceptual comprehension.

Despite the convincing evidence, Nepal's MTB-MLE policy remains poorly enforced. In Bara District, schools still primarily use Nepali and English as their two main mediums of instruction, without proper structures to implement MTB-MLE effectively. As per the policy, Nepali schools are said to comply with the MTB-MLE, but there are informal conditions of partial use of the mother tongues. Teaching mathematics in early grades in exclusive Nepali or English hinders a basic comprehension by learners. The rationale behind mother tongue instruction also has theoretical underpinnings based on Vygotsky's sociocultural theory. In Bara District, children normally enter school without prior knowledge of Nepali, and thus, this study explored the students', teachers', and administrators' experiences of implementing MTB-MLE in Bara District. It considers more than just language use as it also reflects on its pedagogical implications, noting how the inclusion or exclusion of a language affects classroom participation, logical reasoning, and student engagement.

Research Objectives

This study aims to explore the effectiveness and implementation of mother tongue-based multilingual education (MTB-MLE) in teaching foundational mathematics in public schools of Bara District by comparing students' experiences of learning through mother tongue, Nepali and English instruction; examining administrators', teachers' and students' perceptions of using

mother tongue in mathematics classrooms; and identifying the challenges and enabling factors in implementing the MTB-MLE policy.

Conceptualizing Mother Language-Based Instruction in Mathematics

Multilingual countries such as Nepal have considered the Mother Tongue-Based Multilingual Education (MTB-MLE) as a transformational direction of teaching and learning. The language of instruction has a huge consequence in primary education in forming cognitive, socio-emotional, and subject-content proficiency in the early years of studying. Mathematics, which is commonly accepted as a universal language, is indeed extremely prone to context, and its instruction is greatly affected by the linguistic environment surrounding children during learning (Ball, 2011). When children are learning mathematical concepts in a language that is foreign to them, their learning process may produce cognitive dissonance and affect the engagement and study results negatively in the long run (Dhakal, 2021).

There is ample research evidence that shows early mathematics teaching that takes place in the mother tongue of the learners results in a better understanding of mathematics concepts, less anxiety in learning mathematics skills, and an elevated level of student confidence in numbers (Karikari et al., 2022). This is especially applicable in linguistically diverse communities like Nepal, where communities like the Tharu, Bhojpuri, Maithili, Tamang, and Newar have their local languages that are entirely different from the official language of instruction. The need to start teaching a child in his or her native language makes academic achievement easier, as well as develops a sense of emotional well-being and social identity (Ball, 2011, Shrestha, 2018). The well-known language environment enables the new mathematical concepts to be processed in terms of previous learning and the mental framework that is developed through daily interaction.

In Nepal, the Ministry of Education approved the use of MTB-MLE as a component of the School Sector Reform Plan (2009-2015) and eventually through the School Education Sector Plan (SESP) to achieve inclusive and equitable education.

This policy support is notable in the classroom, with little being done in the teaching of mathematics. This can be seen in the findings of Tamang (2024), who shows that even in areas where the languages at home are mostly the local languages, the schools in most cases default to monolingual instructions either in Nepali or English. This contributes to a twofold learning load on young learners: they have to learn a new language and become familiar with abstract mathematical concepts, which is the probable cause of cognitive overload in learners.

The nature of mathematics instruction implies the usage of intricate cognitive functions, like reasoning, problem-solving, pattern identification, and abstract thinking. The children who do not speak the language of instruction also have difficulties explaining their knowledge, asking questions, or discussing mathematical concepts with their fellow students and teachers (UNICEF, 2019). Indeed, according to Baquiller and Abellon (2021), such a language barrier is especially prominent in primary grades, when such concepts as quantity, shape, and number operations are commonly taught through language practices that were culturally embedded. Students, in general, are expected to cram their material instead of comprehending it when they do not have access to their mother tongue explanations.

More so, the concept of teaching a mother tongue in mathematics will help ensure that the gap between home language and school does not exist. As an example, Dhakal (2021) provides the experience of Nepal, where the problems of numeracy children learn to solve at a young age are naturally mediated by the mother language, due to counting objects, measuring ingredients, or watching the market process. The introduction of these real-life experiences in the classroom with references to the same language and terminology used will provide an extra tolerance to mathematical learning that will be significant, as well as worth remembering. By contrast, in case the education process is conducted using a foreign or unfamiliar language, students cannot find a connection between the meaningful experiences in their lives and what they learn at school.

In theoretical terms, the sociocultural theory developed by Vygotsky (1978) strongly advocates the use of mother language in the educational process, as he believed that, as part of the mediator of thoughts, language plays a central role. In his opinion, cognitive process is a manifestation of social interaction, and language is the tool through which knowledge is constructed and internalized. Therefore, when children are exposed to math in the language that they master very well, it seems to be more approachable, and their zone of proximal development is used in an optimal way (Tamang & Pandey, 2025). Constructivist theories of learning also strengthen the premise that teaching must be based on learners' linguistic and cultural backgrounds so that they can actively and meaningfully learn abstract concepts.

It is even more acute in such marginalized areas as Bara District, where local communication is mostly through Bhojpuri and Maithili, but which hardly find their way into classrooms. Joshi and Eslami (2024) argue that even though Nepal is a country with constitutional constraints on linguistic rights, mechanisms related to the incorporation of multilingual education, like teacher preparation, curriculum, and instructional materials, are poorly developed. Consequently, the teaching of mathematics remains in Nepali or English, and the students entering schools without any mastery of either face a disadvantage in their education.

To conclude, the process of introducing MTB-MLE in the teaching of mathematics involves not only a linguistic intervention but a pedagogical necessity, which is grounded in the concepts of equity, cognition, and cultural responsiveness. By allowing students to study mathematics in their mother tongue, learners can establish the basics of knowledge in mathematics with much more confidence and understanding. This, however, cannot be completed without a systematic coordination of the policy environment, curriculum, teacher strength, and social involvement segments, which, to this moment, have not been integrated in the Nepal education system (Gempeso & Mendez, 2021).

Global Perspectives on MTB-MLE in Mathematics Instruction

In multilingual classrooms around the world, Mother Tongue-Based Multilingual Education (MTB-MLE) has been identified as one of the key strategies capable of remediating such systemic inequities as play out in early years of education, especially in mathematics. Although the notion about the mathematicians is that mathematics is culturally or linguistically neutral, pedagogical investigations have revealed that mathematical reasoning is strongly affixed to culture and language.

Conducting an ethnographic study in the Philippines, where MTB-MLE is officially adopted as the policy, Tenorio (2022) evaluated the way how the local mathematics classrooms did it. The results showed that most of the teachers used translanguaging, where they thoughtfully combined local mother tongues and English to keep the concepts clear and allow learners to understand the lessons taught in terms of mathematical symbols, problem-solving, and verbal reasoning. This compliance policy represented a type of educative elasticity in which the object was not linguistic purism but the mathematical comprehension. This is the argument that Tenorio (2022) put forward in claiming that those hybrid practices are most effective where the teachers are trained to manage different linguistic registers without impairing the importance of any of the two languages.

Similarly, the study by Karikari et al. (2022) adds to a growing body of evidence about MTB-MLE in math education. They investigated the role of a local language, Rumanyo, in teaching primary mathematics in Ghana. Their research found that when math was taught in the child's first language, students showed improved performance and had more confidence in participating. Besides academic benefits, the cultural significance of Rumanyo helped students see mathematical concepts in a familiar and comfortable context, which enhanced memorization and increased class participation. The study emphasized that MTB-MLE is not just about translation but about aligning minds so students can think, question, and express mathematical ideas in a culturally and linguistically familiar way.

In Mali, the study by Ouattara et al. (2025) explored the way early grade classroom teachers applied practices of a translanguaging approach within the context of an MTB-MLE policy. They noticed that they tended to kick off teaching with locally known languages, such as Bambara, and slowly allow the use of French, which was used in the national examinations at the time, when students had acquired adequate conceptual understanding. The two-language scaffolding enabled the learners to move comfortably between the everyday and the academic mathematical discourses. The researchers decided that MTB-MLE might be an effective cognitive bridge in those cases when teachers applied local languages to develop primary knowledge and then shifted to official languages to carry out more intellectually challenging tasks.

Experiences in other countries show that successful adoption of MTB-MLE in mathematics entails more than political insistence; it will depend on what teachers decide to do daily in their classrooms. In all three publications (Tenorio, 2022; Karikari et al., 2022; Ouattara et al., 2025), the results indicated that flexibility, the knowledge about the context, and sensitivity towards the linguistic background of the students were crucial in teaching. Noticeably, the existence of tutoring programs that aim at multilingual pedagogy was a common factor that led to the positive results of students within such environments.

Nevertheless, some issues also prevail in these international circumstances. Among these recurring challenges, proper teaching and learning materials are inadequate in the local languages, especially the technical subjects such as mathematics. Adaptation of sophisticated technical terms and phrases in mathematics is under the special requirements of linguistic and curriculum knowledge to ensure the meaning and accuracy are not lost in translation to maternal languages. In addition, languages might not be presented with a standardized vocabulary of some of the mathematical terms, which means that teachers have to invent, adapt, or borrow terms from the larger prevailing languages (Baquiller & Abellon Jr., 2021). This dynamic shows the emphasis on developing resources responsive to the

situation, curriculum, instruction, and assessment in the mother tongue languages.

In the Philippines, Janaban (2025) observed that MTB-MLE pollsters in the Philippines-based MTB-MLE program showed considerable improvement in the competency in arithmetic in Key Stage 1 as compared to students in English-only-based classrooms. Speaking the local language helped to explain the relations between numerals better and made it easier to make children feel more confident in expressing their mathematical thoughts. The research confirmed the notion that teaching in the mother tongue and, in particular, using visual aids and concrete examples, facilitates the change in thinking as children move toward thinking abstractly when learning numeracy.

UNICEF (2019) has reinforced these results by voicing their demands regarding the improved MTB-MLE policies, which do not solely focus on literacy, as on the numeracy level. The report observes that most education systems emphasize language and reading abilities during mother tongue instruction at the expense of the subject-specific application of mathematics and science. It proposes integration of curriculum practices, exclusive teacher education, and longitudinal studies to assess effects on STEM-related learning over long-term achievement in the process of instructional use of the mother tongue.

Overall, the world has interesting perspectives on MTB-MLE in mathematics, highlighting both promise and challenges. Research from Southeast Asia to West Africa shows that student performance improves when taught in languages they understand, especially in abstract subjects like mathematics. The success of implementation, however, depends on teacher preparedness, classroom materials, and curriculum alignment. These international experiences provide valuable lessons that can be applied in Nepal and other multilingual countries as they work to make MTB-MLE a real part of everyday classrooms, not just a standard. The common issues—such as under-resourced local languages, translanguaging challenges, and inconsistent teacher support—are also seen in Nepal's underserved rural areas like Bara. Therefore, international best practices offer both

negative and positive lessons, inspiring the integration of MTB-MLE in practical mathematics classroom settings at the local level.

Empirical Evidence from Nepal and South Asia

The introduction of mother tongue-based multilingual education (MTB-MLE) in the teaching and learning of mathematics is a welcome idea and a challenge that keeps on rising in the South Asian landscape, and specifically in Nepal. Although adoption of the theoretical framework of MTB-MLE has picked up steam in global educational discussions, application is still imbalanced, especially in linguistically diverse yet neglected areas.

In a qualitative case study, Dhakal (2021) assessed this gap by explaining that in numerous schools in Nepal, the default language is either Nepali or English, even in home language areas that do not linguistically find use in Nepali or English. The research revealed that teachers were not properly trained on multilingual pedagogies, and there were rarely any minority languages instructional materials at all, and even when there were, there were few in subjects such as mathematics.

Additionally, Tamang (2024) also pointed out that although the MTB-MLE programs provide opportunities to advance social equity and identity affirmation among the Tamangs and Magars, they usually fail as they lack institutional support. On his ethnographic investigation, he discovered that when the fundamentals of math were explained to students who were in their home language, there was a better understanding of numeracy and a higher participation rate in class. But lack of culturally oriented learning materials, as well as inadequate administrative support, undermined the effectiveness of such approaches. The concept supported by Tamang is that cognitive and emotional comfort of being taught in the mother tongue can be especially useful in learning math in the early stages, where they are likely to work on complex symbolic reasoning and abstract problem-solving.

In a detailed review of the language policy and its implications on academic teaching in Nepal, Joshi and Eslami (2024)

gave a review from the perspective of the subject matter. They determined several structural obstacles that restrain the effective implementation of MTB-MLE in technical subjects such as mathematics. Although constitutional provisions enable the communities to get an education in their mother tongue, the operational mechanisms, like the development of curriculum, assessment tools, and deployment of teachers, were not in place to favour the vision. Consequently, the majority of multilingual classrooms return de facto to a monolingual status with Nepali as the unilateral medium of communication. This makes the children of minority language origin feel alienated and makes it more difficult to reach the mathematics content in a meaningful manner.

The significance of the linguistic context resonates in the South Asian regional studies. As an example, one of the studies conducted by Mohanty (2009) in India and Bangladesh concluded that children who have had to learn in their native language achieved higher results at school in the subjects of mathematics and science. The findings are paralleled in Nepal and indicate that linguistic diversity ought to have been taken care of systemically; otherwise, it would lead to underperformance in education, especially in basic subjects such as mathematics.

Moreover, Ball (2011) claims that the literacy lens is also adopted by most of the countries in the South Asia region, and MTB-MLE has been ignored because of its perspective on developing basic numeracy. Even most teacher preparation programs are mainly concerned with improving the skills of reading and writing the mother language, and not much attempt is made at incorporating mathematical instruction in multilingual classrooms. That shows a policy gap, that MTB-MLE is too narrow in its conception and cannot include more global cognitive domains that children are exposed to in early years.

Scalability of MTB-MLE in the field of mathematics is also highlighted through a comparative analysis that was conducted by Benson and Kosonen (2013) across Southeast Asia. Although the policy frameworks in other countries, such as Nepal, Laos, and Cambodia, facilitate the

practice of multilingual instruction, their localized implementation is hampered by the lack of teacher readiness, the unavailability of instructional tools, and uniform assessment in major languages. These obstacles are reflected in rural parts of Nepal, like the districts of Bara, where Bhojpuri and Maithili are commonly used but hardly employed as a mode of teaching.

Tamang and Pandey (2025) contributed to this discussion by measuring the preparedness of the English and Nepali teachers to teach MTB-MLE, particularly early mathematics lessons. Their survey demonstrated that there was a huge gap in preparedness against the background of the fact that less than a third of the respondents had been trained in multilingual education practices, and the majority of them had difficulties translating mathematical vocabulary into their home languages. Therefore, most of the teachers did literal translation or code-switching with little scaffolding, which led to misunderstanding instead of the development of conceptual clarity amongst their students.

Social attitudes also act as the mediating factor in the usage of local languages, as found out by empirical evidence. Parents and school authorities, in certain situations, acknowledge that exposure to English or Nepali at an early age will help children have good careers, hence they do not favour the implementation of MTB-MLE. According to Phyak (2016), the language hierarchies in Nepal are set firmly, and they affect classroom practices and the implementation of policies. This process tends to put aside mother tongue teaching, even where geographical referential homogeneity would make this a practical and efficient tool.

Thus, empirical data on Nepal and the larger South Asian field demonstrate that although the advantages of teaching mathematics in the mother tongue are well recognized, the rates of its proper introduction are uneven. Research supports the role of local planning, teacher training, and culturally relevant instructional materials in facilitating MTB-MLE. In areas such as Bara, where the linguistic set out of the early years is Bhojpuri and Maithili, there exists a gap between theory and practice which

requires empirical investigation, particularly in the area of mathematics acquisition.

Theoretical Justifications and Learning Outcomes

The sociocultural and cognitive reasons of the MTB-MLE are justified properly in world education theories. Vygotsky's sociocultural theory emphasizes that learning is a socially mediated process, where knowledge is co-constructed through interaction, dialogue, and participation in meaningful cultural contexts (Vygotsky, 1978). This perspective suggests that the use of learners' mother tongue in education provides a culturally relevant environment that fosters both cognitive development and academic success. Language, as used in this construct, serves as the major learning mediation tool. Instructions given to young people in the language that they comprehend aid in the extent to which they can enter the zone of proximal design of enhancement, the interval between what the young person can do alone and what he/she can do with assistance. During mathematics training, when the capacity of abstract thinking, symbol manipulation, and logical order is required, understanding that is based on well-known language forms boosts cognitive support and problem-solving.

Constructivist theories also help defend the application of MTB-MLE because learners are busy constructing new knowledge using the experiences and culture they have had before. In an instance where teaching and learning are done in the mother tongue of the child, this means that teaching and learning are being conducted within the context of the systems of existing knowledge of the child, hence making the understanding of the mathematical principle more meaningful and long-term. These theoretical approaches clarify why students demonstrate better literacy and have lower mathematics anxiety, as well as a sense of greater confidence in multilingual classrooms. According to Ball (2011) and Benson (2011), the mother tongue aspect helps in learning both emotionally and academically, particularly where it is employed on a systematic basis in basic subjects such as mathematics.

Besides, a cognitive load theory implies that to learn adequately, an amount of

occasional mental effort must be reduced to a minimum. A lot of multilingual students have to develop the competence in processing instructional language, and they have to do it at the expense of the processing that has to occur to learn new things. Such divided concentration might play an extremely negative role in the learning process, particularly in math, where precision, grammar, and logic play the main part. With the use of the mother tongue method, the students can direct their mental faculties to the content instead of making an effort at translation, hence improving the overall learning level.

Research Gap

Despite the global evidence on the beneficial aspects of MTB-MLE in mathematics, an explicit void continues to exist regarding Nepal, particularly less-studied areas like the Bara District in the Madhesh Province. Academically, most research studies in Nepal have concentrated on either the overall literacy or the sociopolitical factors of language policy, with little regard to the subject-to-outcome in the multilingual primary classrooms. Dhakal (2021) and Joshi and Eslami (2024) have agreed that this omission has always taken place, especially in technical subjects such as mathematics, and remains fragmented and anecdotal.

Bara District is the case study where the issue of the intersection of language and learning is rather appropriate because of the diversity of the linguistic environment that prevails among Bhojपुरi speakers and Maithili speakers. Nonetheless, formal learning of these languages virtually does not exist, and when it is taught in the few schools that do, it is usually done without resources, well-trained personnel, or the support of the community. This creates classrooms where students learn mathematical terms, concepts, and operations in Nepali or English, which may not be fully comprehensible to them. Therefore, there are multiple levels of prejudice against these students: they have to not only understand some abstract mathematical material, but also make sense of unknown instructional language at the same time.

In addition, little research exists in a systematic way as to how teacher readiness, curriculum planning, classroom resources, and the language policy interplay to affect mathematical learning progress in such areas. Although projects by Tamang (2024) and Tamang and Pandey (2025) have set the stage on the topic of multilingual teacher education and cultural sensitivity, we have yet to close the important gaps in subject-related and geographically-focused data. Lacking this local input, national policy is in no position to address the reality of the requirements of teachers and learners in linguistically diverse districts such as Bara.

This study thus attempts to address this gap by not only generating qualitative field-based data about the effects of mother tongue-based instruction, especially in Bhojpuri and Maithili, on early learning of fundamental mathematical concepts, but also to do so in a manner that contributes to theory building in this area. Through the investigation of experiences of learners, instructors, and administrators, the study aims at revealing the possibilities and constraints of implementing MTB-MLE in mathematics and providing data that can guide the future pedagogical approaches and language-in-education policy-making in Nepal.

Methodology

A qualitative case study design was used to understand how mother language-based instructions affect the understanding of fundamental mathematics principles in the Bara District at the primary level. Case studies allow methodological flexibility. They may include interviews, observations, document analysis, and artifacts, giving researchers a rich understanding of participants' perspectives (Creswell, 2013). The approach was selected as it captures the nuances of experiences, perceptions, and practices teachers and students engage in their educational settings. Given that the Bara community has a high level of linguistic diversity, especially with widespread use of Bhojpuri and Maithili, this qualitative case study approach allowed for an in-depth exploration of how local languages can be integrated into early mathematics lessons and the effect these languages have on students' conceptual understanding.

A qualitative case study design was utilized to provide an in-depth understanding of the effective use of the mother tongue as the medium of instruction. This approach helps to understand the "how" and "why" questions within the naturally occurring context (Yin, 2018). This type of design enabled the researcher to go beyond studying not only the results but also the processes, challenges, and contextual factors involved in multilingual instruction in primary mathematics classrooms. The researcher focused on personal experiences of the participants by using interviews, observation, and document analysis.

The study was carried out in two public primary schools in Bara District in Nepal, which is linguistically diverse, with Bhojpuri being spoken by the majority of the community at home. The two schools were chosen purposefully on the reason that they participated in initiating Mother Tongue-Based Multilingual Education (MTB-MLE) practices. The sample of participants was represented by three teachers of mathematics, two head teachers, and six students (three in each school, studying in grades 2 or 3). All the participating students were native Bhojpuri speakers, and their response provides a window of understanding of experiences they could have as far as learning the initial principles of mathematics in their native language is concerned.

Purposive selection was applied as a method of finding the participants who had first-hand experience of working with the mother tongue-based multilingual education (MTB-MLE) during the teaching of mathematics. The teachers who already had training associated with MTB-MLE or the teachers who were actively involved in using Bhojpuri as their local mother tongue in classroom teaching were prioritized. All the students were selected based on their backgrounds as Bhojpuri speakers, and on informed suggestions by their teachers, who could give credible reflections on their learning experiences. In addition, the school head teachers gave administrative and policy implications of the institutional support and challenges that attended the use of MTB-MLE in early-grade mathematics classrooms.

Data Collection Techniques

The qualitative method has been used in the work where in-depth, semi-structured interviews were taken as the only method of data collection. Such an approach was selected to have detailed, vivid information about the personal experiences and perceptions of the participants, as well as the problems they face in the context of mother tongue usage in mathematics education.

Each open-ended question developed between educators (teachers and school administrators) and students addressed the work of the educators (teachers and school administrators). Five educators, including two head teachers and six students at the primary level, were interrogated. All interviews were audio-taped with the informed consent of the interviewees and then transcribed verbatim, and the analysis was performed.

Data Analysis and Interpretation

Thematic analysis was applied to the qualitative data sets available in the interview transcripts files by analysing, identifying, and reporting the patterns (themes) within the data. The results are classified into four paramount themes that came out based on the experiences and perceptions of the participants on the application of mother tongue during the teaching of foundational mathematics.

The Unofficial Policy: Mother Tongue as a Foundational Bridge to Learning

The formal medium of instruction is Nepali and English, but the statistics found show that the use of local mother tongues, especially Bhojpuri, is a common and essential ad hoc procedure of conducting a classroom. This is not in the school policy, but it is a convenient plan that teachers embrace to bring understanding, particularly in younger students.

The headmaster explained that this flexible teaching method starts with Bhojpuri, then moves to Nepali, and finally to English. This is a strategy that he called a bridge, so that it can help in teaching effectively in the community. The teachers echoed this sentiment. Hem Bahadur Chaudhary, one of the teachers, explained his approach: *When students find it difficult to understand, we use their Mother Tongue to explain. We have not officially used the mother tongue in*

instruction... [but] if needed, we clarify in their mother tongue. This informal, teacher-directed approach is the de facto language policy at the classroom level, as it is in direct response to the linguistic needs of the students.

Impact on Classroom Dynamics: Enhanced Engagement and Emotional Safety

All interviewed educators agree unanimously in the opinion that teaching in the mother tongue will make the learning environment more positive and effective. Such language awareness leads to an emotional feeling of safety, which is a direct link to greater academic activity.

Increased Participation and Confidence: Teachers noticed a significant rise in the involvement of students. Teacher Ramesh Yadav noted that when he uses Bhojpuri, *"the rate of them answering is higher"* and students speak with *"great enthusiasm"*. The headmaster noted that students appear to be happier and eager learning, and more active during the classes. This increase in confidence plays a primary role in a literal field like mathematics, which can at times be intimidating to young learners.

Authentic Communication: One of such differences found was the quality of student-to-teacher interaction. Teachers observed that under Nepali-only instructions, those students who fail to comprehend may just consent or keep quiet. Nevertheless, when Teacher Yadav resorts to using their native language, as he said, *"they openly say, I did not understand, and it will be far more effective"*. That would make the feedback loop more natural, with teachers having an opportunity to know about learning gaps in real time.

The Student Perspective: Navigating a Multilingual World

The interviews with the students were insightful and revealed that a multilingual classroom has no unified solution. They are influenced by their language background, their social setting, and they are also influenced by their comfort levels.

The Mother-Tongue Advocate: Among the Bhojpuri-speaking students, it is evident that mother tongue is the desired mode of instruction. The reason behind

choosing Bhojpuri as the language of learning that Pritti Kumari gave was: *it would also be better and easier since now she would be able to ask her parents at home about the homework. The use of peer learning by her also occurs in her first language, proving that it is her first language in which she processes the academic concepts.*

The Pragmatic Learner: Salim Yadav, a student from the Bhojpuri community, represents the social complexities of MTB-MLE. While he expressed a personal desire to be taught "in my language", he ultimately concluded that Nepali was better for the class as a whole because "*my friends won't understand then*". His experience demonstrates that a one-mother-tongue strategy in a heterogeneous classroom is not inclusive, and students embrace a shared language to be taught as a group.

The Adapted Learner: The case of students such as Rajan Patel and Nishant Shah is an example of the language shift phenomenon, according to which Nepali has achieved the status of their leading academic language. Nishant, although from a Shah background, stated, "*I only understand Nepali,*" and confidently asserted that "Everyone understands Nepali" in his class. Rajan Patel also said that he has found it easier to understand and to ask questions when it is in Nepali, or even would like the teacher to use only Nepali.

Systemic Voids: The Challenges of an Unsupported Practice

Although its pedagogical advantages are obvious, the lack of institutional support reduces the possibility of using MTB-MLE to manage a complex linguistic scenario dramatically, as teachers have to cope with it without any resources or support.

Absence of Training and Resources: All teachers complained of the lack of support. Headmaster Lal Babu Shah confirmed, "*No, there are no official materials available in Bhojpuri*". Teacher, Sita Koirala, is a non-local teacher who emphasized about training gap, saying that the major problem is that she is not able to get the questions asked by the students without the assistance of other persons. This indicates a very dire need for not only language-specific material but also pedagogical training.

Lack of Formal Policy and Support:

The administrators at school also affirmed that there is no particular school policy of MTB-MLE, and there is no support from the School Management Committee. The classroom situation where the mother tongue is used is purely left to the initiative of individual teachers, as opposed to a systematic plan of the school.

Discussion

The findings from this study in Bara district offer thick, qualitative data that, at the same time, confirm and complicate the national MTB-MLE policy framework. A practical use of translanguaging pedagogies can be seen in the informal bridging that occurs when the teachers use the mother tongue to conceptualize a given chunk and then repeat that in Nepali. It reflects the findings of international studies identifying that on an international scale, teachers are more likely to creatively interpret policy by crossing languages to sustain the idea ([Tenorio, 2022](#)). There is no training, but simply the intuitive application of such principles by the teachers in Bara based on the needs of their students in the here and now.

This sentiment greatly attests to the social constructivist theory developed by Vygotsky that holds that language is one of the major mediators of mental development. When teachers adopt a familiar language, they develop an emotionally secure zone of proximal development in which abstract mathematical concepts are more accessible, thereby lessening the so-called classroom anxiety described in your abstract. Moreover, learning strategies, mental and emotional development are also connected with their culture, as Shrestha (2016) states, "People not only use language as a means of communication, but they also express their values, beliefs, and world views through it" (p.55).

Nevertheless, the study also shows that there is a major gap between the potential of MTB-MLE and its application, which was recognised in earlier studies in Nepal ([Dhakal, 2021](#); [Tamang & Pandey, 2025](#)). The identified predicaments mentioned by all the educators, an absence of preparation, an absence of locally available materials, and a lack of policy guidance based on the ground-

level studies, and the policy lapses were observed at a national level. This puts the teachers in an awkward situation, and they are forced to be innovative without the support of the institution.

Additionally, there is a critical dimension to the whole conversation, informed by the subtle students' views, especially the predicament of the Bhojpuri-speaking students. The fact that they care about their peers tells us that a single and strict approach to a mother tongue may lead to new kinds of exclusion within highly heterogeneous classrooms. This makes the policy of MTB-MLE more complicated and directs towards the necessity of more flexible and translanguaging orientations instead of the instant replacement of one language of instruction by another.

Recommendation

Based on the direct feedback from teachers and the needs observed in classrooms, the following recommendations are proposed:

Invest in Teacher Training:

Multilingual pedagogy pre-service and in-service training should be rendered mandatory at the Ministry of Education and local governments. These training sessions are supposed to provide pragmatic approaches to the utilization of mother tongues as a cognitive bridge in linguistically very diverse classrooms that help teachers to have the capacity to deal with such environments competently.

Develop and Distribute Localized Teaching Resources: The curriculum designers, through the cooperation of the local governments, should develop and deliver the culturally appropriate, language accessible teaching aid, supplementary material, and textbooks of the primary mathematics subjects in the predominant local language, such as Bhojpuri. The fact that materials are not available now obliges educators to do translation on the spot, which is ineffective and unreliable.

Formalize a Flexible Language Policy: Local education units should advise the schools to work out a formal language policy that acknowledges and promotes the use of the mother tongue to teach young learners. The policy must be dynamic, such that it encourages translanguaging as

opposed to a strict single language requirement to suit the requirements of heterogeneous classrooms.

Strengthen Human Resources in Schools: School management must take into account innovative staffing models in case classrooms have many students and linguistic diversity. This may involve two educators, where one is conversant in Nepali and the other in the leading local language, as recommended by one of the teachers. Moreover, inclusion of a practice, which already occurs informally, such as peer-tutoring, may be a beneficial low-cost tactic.

Conclusion

This qualitative research shows that teaching in the mother tongue of students, even in the absence of actual formal requirements, promotes higher levels of mathematical cognition, drives them to join classroom activities, and promotes the emotional and cognitive growth of young learners in Bara district. Mother tongue as a pedagogical bridge makes the learning environment friendlier, more efficient, and emotionally secure. Nevertheless, the extent of such a practice mainly depends on teacher-by-teacher interest nowadays and is highly limited by the absence of a formal policy, training, and resource management. To shift to the permanent adaptation to a viable and nonprejudiced model of teaching/learning, systemic assistance is necessary.

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