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Tuwali in Mathematics Instruction: Its Impact on Junior High School Student Learning and Performance

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Abstract
Aim: The main goal of this study is to investigate the role of Tuwali as a medium of instruction in Mathematics and its impact on student's academic performance at Bangbang National High School, Hungduan, Ifugao.
Methodology: A descriptive-correlational analysis was conducted on 106 junior high school students, examining their perceptions, gender differences, and the instructional effects of Tuwali on academic performance.
Results: Students generally perceive Tuwali as beneficial for learning Mathematics ($M = 3.863$), with female students showing a significantly higher level of agreement ($p = 0.004$). Additionally, students' perceived benefits of Tuwali moderately correlate with their achievement scores ($\rho = 0.317$, $p < 0.01$).
Conclusion: The findings highlight the importance of mother-tongue-based multilingual education (MTB-MLE) in enhancing student comprehension, engagement, and academic performance. The study suggests that educational institutions should implement policies promoting language-inclusive teaching strategies.

Keywords: Mother-Tongue-based instruction, Mathematics education, academic performance, indigenous language learning

INTRODUCTION

Students need language abilities for their intellectual growth and their educational achievements. The consideration toward using indigenous languages in schools of multilingual societies exists as a pathway to enhance academic outcomes, student understanding, and school involvement. Tuwali is the indigenous linguistic dialect spoken by most people residing throughout Ifugao in the Philippines. The perception that mathematics is a universal language fails to account for how students experience difficulty when teachers use foreign language in educational instruction. Using Tuwali as a teaching language in math classes could yield enhanced understanding and improve knowledge retention and academic achievement results. However, available data about Tuwali language application in mathematics classrooms and its impact on student educational results remains scarce.

According to the research findings, students develop a better understanding of mathematics when their instruction combines indigenous languages with mathematical material. A Philippine study showed that teaching local languages decreased language obstacles in schools yet led to weakness in reading and math learning (Tenorio, 2024). Subjects who received education in their spoken mother tongue at Nigerian schools achieved better results in both reading and mathematics than students undergoing traditional instruction (Adeyemi & Adepoju, 2020). A South African research investigation showed how second-language students had difficulty developing mathematical understanding, thus demonstrating the need for bilingual learning programs in education (Setati-Phakeng, 2020). The research results demonstrate why schools should adopt localized education language guidelines. The research conducted by Seid (2017) showed that students learned mathematics more successfully in their native language compared to English as their instruction language in Ethiopian educational settings. According to De la Cruz et al. (2020), the understanding of mathematics develops through familiarity with both language and context. On the contrary, numerous researches have demonstrated that students studying mathematics in a second language

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experience difficulty comprehending the language in math problems although they have sufficient mathematical capabilities (Fatmanissa & Novianti, 2022; Moschkovich & Scott, 2021; Krick-Morales, 2025). Two research studies by Carless (2007) and Philp and Duchesne (2016) showed that students participating in mother tongue-based programs became more willing to discuss in class while attempting complex tasks. Logical research from Abrams et al. (2013) and Kadonsi et al. (2023) proves that placing mathematics questions within native cultural backgrounds helps students both participate better and gain improved educational outcomes.

Teachers who teach using the mother tongue of students explain concepts more effectively while creating better communication, according to Vu et al. (2023). According to UNESCO (2016), reading-oriented subjects demonstrate superior results than girls, whereas boys display better numerical reasoning abilities. In the study of Walter and Benson (2012), they found that when students learned their mother tongue in primary education, they delivered better academic results at both secondary and tertiary levels. It is supported by Gonzalez-Martin et al. (2024), who demonstrated how proficient bilingual students show better mathematical encoding and processing skills, specifically when working with non-language-related activities. Additionally, research from Malaysia discovered that Aboriginal students reached better academic results in STEM subjects through education in their original language (Abdullah, 2022). According to Dekker and Young (2005), students who received instruction in their first language outperformed students who only learned through English. The employment of code-switching using indigenous languages and English helps students better understand mathematics concepts, according to Setati and Planas (2012). Worldwide education equality requires first language instruction, according to UNESCO (2022). Nigerian research showed that pupils instructed through their native language showed superior literacy and numeracy results than pupils learning under traditional English-based education (Alimi et al., 2020). The debating sessions in Australia evaluate the potential adverse effects on fundamental mathematical learning when Indigenous culture enters the curriculum framework (The Australian, 2024). A study from Malaysia discovered that incorporating the Orang Asli language in mathematics instruction can enhance the understanding and engagement of students (Abd Jalil et al., 2023). According to Patalinghug et al. (2018), teachers implementing mother tongue-based education (MTBE) in math classrooms reported enhanced student participation rates and better conceptual understanding. Nowadays, teachers face problems with limited teaching resources and inconsistent language use (Tungul & Lapinid, 2024). The analysis by Igarashi et al. (2024) of MTBE implementation showed that MTBE minimized language barriers while reducing fundamental reading and math proficiency gains. A proper balance should be established when implementing mother tongue instruction to achieve maximum learning success.

Various studies, including Nahole and Haimbodi (2022), Kadonsi et al. (2023), and Gavarrete (2015) have demonstrated that most teachers need supplementary training to master mathematics teaching with Indigenous languages. Mother tongue education is a key dropout prevention tool, according to Pon and Cameron (2024) and McCaffrey and Jhingran (2024), because it enables students to access educational content more easily. Bermejo et al. (2021) and Esuong et al. (2024) proved that students utilizing their mother tongue enhance mathematical analytical reasoning abilities. The establishment of native language use in educational settings creates active parent and community participation, which generates improved student outcomes, according to Best et al. (2013). Reviews by Trujillo (2020) showed that students reach a better understanding when learning through their mother tongue language while also participating effectively in class discussions.

The research by Begum et al. (2024) and Rucker (2023) discovered that educational programs featuring bilingual instruction with mother tongue support produce students who acquire improved cognitive abilities and enhanced critical thinking skills. Bilingual students achieve higher performance by employing their first language to construct mathematical concepts, according to the research by Anchan and Soylu (2023). Apostol (2019) investigated numeracy performance through his study in the Philippines, which showed that students educated in their native language achieved better results than students instructed in a second language. According to the theoretical framework of cognitive development by Vygotsky (1978), children learn better by using native language to build knowledge. According to Skutnabb-Kangas and Dunbar (2010), students must overcome cognitive challenges when they need to study a foreign language since it leads to a decrease in achievement levels across all educational subjects.

Current research on multilingual teaching classrooms proves that class instruction through the first languages of students leads to better comprehension and increased student interest. According to Benson and Kosonen (2013), students achieved superior math assessment results when studying through bilingual education rather than English-only programs in Ethiopian classrooms. The findings of Setati and Planas (2012) also indicated that students in South Africa demonstrated a better understanding of mathematics through code-switching between indigenous languages and English. The lack of remote learning content access in the mother tongue of students,

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according to UNESCO (2022), increases the possibility of learning loss, student dropouts, and educational exclusion. The GPE Secretariat (2019) stressed how mother tongue education combats student dropouts while improving their comprehension depth. The primary educational advantage lies in improved teacher-student communication, which enables teachers to capitalize on pre-existing student knowledge when they use their native language(Benson, 2004).

Different research projects have studied mathematics teaching methods in Ifugao, a province of the Philippines. Cabauatan (2024) studied the inclusion of traditional Ifugao teaching practices, which include oral communication and cultural storytelling in mathematics education throughout Ifugao schools. Through these methods, students encounter real-life uses of mathematical concepts, which help them understand their classroom learning. Students in Ifugao proved to be more engaged when mathematics problems presented concepts from their everyday lives about farming and weaving and their traditional measurement systems, according to Capua (2021). Many teachers encounter ongoing difficulties in transforming mathematical terms since various mathematical ideas lack straightforward linguistic translations, according to Lartec et al. (2014). The shortage of instructional materials available in the mother tongue obstructs teachers from implementing efficient teaching approaches. The lack of digital literacy among teachers living in rural communities prevents them from using contemporary teaching resources within mathematics instruction, according to Gqoli (2024).

The research conducted by Monje et al. (2019) revealed that students achieved better results in conceptual abilities along with analytical skills through mother tongue instruction. However, they struggled with computational problems and solving tasks. The students' mathematical skills were primarily shaped by their ethnicity and mother tongue variance, although their socioeconomic background proved irrelevant due to vocabulary limitations in mother-tongue-based mathematics education. Research results indicated that boys outperformed girls in geometry concepts and spatial reasoning, although girls displayed better performance in problem-solving activities (Clark, 2019). Research showed comprehensive support for instruction through primary languages in mathematics classrooms because it leads to higher achievements, advanced mental capacities, and increased student participation. However, there was no research conducted in Ifugao educational settings to verify sex-specific analysis from teaching through indigenous languages and beneficial approaches to address language and technology-related challenges. Tuwali language implementation in mathematics teaching represents a research goal to expand understanding about its academic benefits and student performance connections.

The study is significant because it explores how mother tongue instruction enhances mathematical learning, specifically for indigenous students. The produced research data will help develop learning strategies that naturally connect to Ifugao students' linguistic abilities and cognitive patterns. The study provides helpful information that educators and policymakers can use to create more effective curriculums and better train teachers specifically to enhance their ability to promote inclusive learning. Furthermore, this research will resolve issues concerning language differences in mathematics teaching while providing Indigenous students with equal educational opportunities.

Objectives

The primary objective of this study is to assess the effectiveness of using Tuwali as a medium of instruction in teaching mathematics and its impact on student's academic performance.

Specifically, it sought to answer the following questions:

1. What is the perceived benefit of Tuwali in Mathematics instruction?
2. Is there a significant difference between the perceived benefits of Tuwali in Mathematics instruction and their sex?
3. What is the Mathematics performance of the students?
4. Is there a significant relationship between the perceived benefit of Tuwali in Mathematics instruction and the Mathematics performance of the students?

Hypothesis

Given the stated research problem, the following hypotheses were tested on a 0.05 level of significance:

Hypothesis 1: There is no significant difference between the perceived benefits of Tuwali in Mathematics instruction and their sex.

Hypothesis 2: There is a significant relationship between the perceived benefit of Tuwali in Mathematics instruction and the Mathematics performance of the students.

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METHODS

Research Design

The research design consisted of descriptive-correlational approaches to study how Tuwali language effectiveness works when teaching mathematics. The research investigated how Tuwali language use benefits mathematics teaching while evaluating its connection to student achievement records. The survey technique was used to collect data on perceptions from respondents and mathematics grades as an indicator of academic achievement. The research investigated variation in perception levels between male and female participants and analyzed to what extent self-reported benefits associated with Tuwali utilization correlated with student performance results.

Population and Sampling

Junior high school students from Bangbang National High School in Hungduan Ifugao formed the sample participants for this investigation. Official enrollment records indicated 68 males together with 76 females within the student population. The researcher used proportional stratified random sampling to obtain a representative sample. The researcher implemented this approach to choose subjects whose demographics match the gender ratios of the overall population. Slovin's Formula allowed the researcher to identify an appropriate sample number, which delivered statistical validity combined with proportional participant distribution. The researcher applied the determined sample size by using random selection methods within both gender groups to achieve unbiased participant representation.

Instrument

A survey questionnaire served as the principal research instrument during this study. It was adapted from the Benefits of Using the Igbo Language with English for Instruction Questionnaire of Ezepue et al. (2023). It was tested for validity and reliability. The face and content validity were ensured through expert review. Reliability analysis was also performed to ensure its internal consistency. With the 17 items subjected to the analysis, the result of the analysis shows that the survey instrument has an overall 0.849 Cronbach's alpha which indicates good reliability.

Data Collection

After receiving authorization from the school head, the researcher established her research instruments for data collection. Before conducting the survey administration process, the researcher explained the research objectives to the respondents.

The survey administration appointment was done during regular school hours after a shared agreement between the researcher and the school head. Members of the research population received the survey when the researcher administered it.

The participants obtained information that protects their identity with continuous notifications about confidentiality rights during their participation in the research. The participants obtained ample time to respond to the survey questions.

Treatment of Data

Analysis of the gathered data relied on quantitative and qualitative methods. Frequency tables, percentages, and means to analyze the profile and attitudinal scale. Each item in the scale received specific rating options among the five response possibilities. The researchers utilized a T-test to determine the differences between groups. To analyze the relationship between the variables, Pearson was used.

Ethical Considerations

The researcher protected both participant safety and ensured proper care for institutions involved in the study. All participants were granted informed consent to join the study after the researchers detailed the research objectives, the procedures needed, and the voluntary nature of their participation. Participants received the chance to ask any queries, motivating them to issue consent to participate. All information obtained from the study was securely kept confidential by using coding strategies that protected the profile of participants. Respondents maintained absolute privacy through the protection of their non-disclosed personal information. All participants

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maintained complete autonomy regarding their participation in the study because they could withdraw at any time without facing any adverse effects, and their decision to exit the research was always accepted. The researcher made sure to take all required measures that safeguarded participants from physical, emotional, and psychological potential harm during the research duration.

RESULTS and DISCUSSION

Perceived Benefit of Tuwali in Mathematics Instruction

Table 1 demonstrates that the respondents believe that Tuwali, the native tongue, benefits mathematical education. Results indicate a positive perception of incorporating the Tuwali language into mathematical education since participants scored 3.863 points on average. Students learn more effectively in their first language, and this perception leads to the ranking as a resilient benefit (M = 4.08). Utilizing Tuwali in mathematics instruction also improves cognitive development (M = 3.90), which confirms the socio-cultural theory since it relies on language to advance students' cognitive functions. Tuwali language deployment improves educational results through enhanced student-teacher dialogue and teacher usage of existing student knowledge resources (M = 3.80 and M = 3.72, respectively). Bilingual education creates better relationships between teachers and students while improving student engagement through its ability to overcome language and cultural differences between teachers and their students.

Table 1
Perceived Benefit of Tuwali in Mathematics Instruction

No.	Indicators	WM	Desc
	Use of Tuwali with Mathematics will:		
1	Promote higher learning outcomes.	3.86	A
2	Increase the rate of completion of secondary education.	3.69	A
3	Reduce the number of out-of-school children.	3.38	N
4	Improve academic performance.	4.08	A
5	Enhance students' cognitive development.	3.90	A
6	Enhance reading, learning, and comprehension.	3.76	A
7	Impact other aspects of student development.	3.62	A
8	Improve social relationships.	3.76	A
9	Promote learning in all academic subjects.	3.67	A
10	Strengthen teacher-student interaction.	3.80	A
11	Allow teachers to build on students' prior knowledge.	3.72	A
12	Improve education outcomes in the long run.	3.67	A
13	Give students a stronger sense of identity.	3.78	A
14	Make teachers more effective in communicating with the students.	3.99	A
15	Enhance participation in a global society.	3.80	A
16	Promote interaction with families and communities.	3.81	A
17	Build confidence in the students.	3.87	A
Total		**3.863**	**A**

0.50 - 1.49 *Very Dissatisfied (VD);*
1.50 - 2.49 *Dissatisfied (D)*
2.50 – 3.49 *Neither Satisfied or Dissatisfied (NSD)*
3.50 – 4.49 *Satisfied (S)*
4.50 – 5.00 *Very Satisfied (VS)*

The outcomes further indicate that integrating Tuwali instruction has potential benefits regarding educational progress and social achievements. The use of Tuwali improves family-community participation (M = 3.81) and global society involvement (M = 3.80). The data demonstrates that multilingual education through native languages (MTB-MLE) creates social engagement and community cooperation in educational processes. Moreover, language is an essential factor in developing student identity because students agree (M = 3.78). According to

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studies, students who receive education in their mother tongue develop stronger cultural identity and self-assurance. The study shows students gain confidence through teaching with Tuwali because they scored M = 3.87 on this measure. However, the perceived impact rate of using Tuwali for reducing school dropout is considered neutral at M = 3.38. Although language might be one contributing factor, multiple socio-economic elements play the dominant role in students leaving school. Data from this study indicates language integration as a solitary weak spot because it demonstrates insufficient agreement to resolve the problem independently. The research outcomes demonstrate that integrating Indigenous languages into education enhances mathematics teaching methods. Educational equity and effectiveness require linguistic inclusivity, as indicated by the mean agreement score of 3.863 across most indicators.

Multiple studies indicated that educational approaches based on students' first language create better academic achievements and improved mental processing (Cummins, 2000; Bialystok, 2011; and Benson, 2005). Language is an essential factor in cognitive development through its social nature, which shapes the learning process, according to Vygotsky (1978). Bilingual education promotes a positive effect on teacher-student interactions and student engagement, according to García and Wei (2014). Additionally, UNESCO (2016) found that mother-tongue-based multilingual education (MTB-MLE) creates social integration in instruction and boosts community participation in learning activities. According to Skutnabb-Kangas (2000), linguistic diversity is a basis for strengthening cultural identity and student confidence.

Significant Difference in the Perceived Benefits of Tuwali in Mathematics Instruction and Their Sex

Table 2 shows a statistically relevant difference between genders who assess Tuwali mathematics instruction benefits (T = -2.887, p = 0.004). The study results showed that female participants view Tuwali benefits more intensely than males through their average ratings (M = 4.0566) compared to males (M = 3.6698). Female participants demonstrate better recognition than male respondents regarding the benefits of employing Tuwali in math education. Tuwali instruction generates different educational outcomes between males and females because students process language instructions through unique learning styles and social learning environments. The research data confirms that mathematics education requires teaching methods that address multiple perspectives about language integration learning.

Table 2
T-test table for the Perceived Benefits of Tuwali in Mathematics Instruction and Sex

Sex	Mean	Qualitative Interpretation	T-value	P-value	Remarks
Male	3.6698	Agree	-2.887	0.004	Significant
Female	4.0566	Agree			

Research has investigated multiple patterns that connect gender with academic results and language perception. According to data from the Programme for International Student Assessment (PISA) research (OECD, 2019), women demonstrate better language aptitude with confident linguistic educational techniques than men. The data confirms that female students demonstrate greater acceptance of mathematics education when it incorporates the Tuwali language into instruction. The utilization of Tuwali language instruction in mathematics classes would boost the interest and academic results of female students because language abilities directly impact their mathematical problem-solving abilities.

Academic progress and intellectual growth of students increase when they receive instruction in their native language by Cummins (2000). Their higher aptitude for language-based teaching methods does not exclude male students from benefiting as much academically from being taught in their native language. Male and female students form their perceptions of language-based education because of social elements that affect their linguistic exposure and cultural expectations that shape their educational experiences. Vygotsky's (1978) socio-cultural theory explains how learning progresses through social interaction with cultural tools since linguistic instruments influence student cognitive development. The incorporation of Tuwali into mathematics education acts as a way to help students acquire new knowledge through familiar linguistic and cultural frameworks.

García and Wei (2014) investigated the translanguaging educational concept that facilitates better student engagement and learning through unrestricted language movement. The research showed that female students presented better linguistic versatility and enhanced multiple-resource language skills when they studied. The ability

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to use different languages easily explains why female learners achieve determined perception scores in language-based education. This leads to an argument promoting the practice of the Tuwali language in mathematics classes.

Multilingual education frameworks adopted from UNESCO (2016) Mother Tongue-Based Multilingual Education (MTB-MLE) demonstrate linguistic inclusivity as a foundation for improving academic results. Through this educational model, access to instruction finds equality since students from both genders can learn using their most familiar language. Educational success will improve when Tuwali language integration unfolds in mathematics classrooms since it fosters cognitive learning and socio-cultural development.

The practice of the Tuwali language in mathematics education aligns with international educational standards and reduces gender-based linguistic challenges in school performance. The connection between language and pedagogy about gender shows educators must implement culturally responsive teaching methods to serve various students, which develops a complete, equitable educational process.

Performance of Junior High School Students in Mathematics

The mathematical performance assessment of junior high school students is presented in Table 3. A moderate number of students achieved a "Fairly Satisfactory" grade in mathematics, which reveals proper understanding, although more improvement opportunities exist. On the other hand, 16% of the students realized a "Satisfactory" level, 11.3% garnered a "Very Satisfactory" level, and only 8.5% got an "Outstanding" level in mathematics. It is also worth noting that 11.3% of the students "Did not meet Expectations" which indicates students need targeted interventions to help them advance in their learning.

Table 3
Performance of Junior High School Students in Mathematics

Level of Mathematics Performance	Frequency	Percent
Did not meet Expectations	12	11.3
Fairly Satisfactory	56	52.8
Satisfactory	17	16.0
Very Satisfactory	12	11.3
Outstanding	9	8.5
Total	**106**	**100**

The results indicate that average performance exists among a significant portion of students, but additional educational strategies should target their advancement to higher ability ranges. By implementing different instructional methods together with corrective programs and teaching approaches that incorporate cultural relevance, like mathematical Tuwali instruction, the learning outcomes of students should improve. The data shows that improving basic mathematical skill training is vital for encouraging more students to advance through proficiency stages.

Studies have revealed pieces of evidence that the mathematics achievement of students depends on multiple classroom variables, particularly the language teachers use for instruction. Students learn better when they learn in their familiar language because it promotes both mental growth and academic performance, as reported by Cummins (2000). This corresponds to the idea that using the Tuwali language in Mathematics instruction may enable students to understand challenging mathematical ideas better.

According to the socio-cultural theory of Vygotsky (1978), students can better comprehend their lessons when they receive instruction in their native language through social interactions. In addition, translanguaging approaches using various linguistic tools of García and Wei (2014) help students achieve better academic results, including mathematics learning.

Moreover, the United Nations Educational Scientific and Cultural Organization (UNESCO) (2016) placed great emphasis on mother-tongue-based multilingual education (MTB-MLE) because it enhances academic achievement and student involvement. The Organisation for Economic Co-operation and Development [OECD] (2019) proved through research that students who learn mathematics in their native language build better problem-solving abilities and produce superior assessment results compared to students who study mathematics in a distant language.

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Significant Relationship in the Perceived Benefit of Tuwali in Mathematics Instruction and Performance in Mathematics

Students who positively viewed Tuwali mathematics instruction displayed better mathematics results, according to the data in Table 4. The two variables show a statistically significant relationship with .317 as their correlation coefficient demonstrates a positive yet moderate association at the 0.01 level. It signifies that those students who perceive Tuwali help mathematics teaching achieve better academic results in this subject area. The weak link between Tuwali integration and student mathematical achievement shows that this approach has meaningful educational benefits for students. The result reveals valuable evidence regarding how cultural teaching methods help students achieve higher academic results.

Table 4
Relationship between the Perceived Benefit of Tuwali in Mathematics Instruction and Performance in Mathematics

Category	Perceived Benefit of Tuwali in Mathematics Instruction
Performance in Mathematics	.317**

***. Correlation is significant at the 0.01 level (2-tailed).*

Multiple educational studies analyzed the connection between the method of instruction delivery and academic achievement outcomes for students. According to Cummins (2000), students benefit cognitively and achieve academic success better when they acquire knowledge in a familiar language, especially when studying abstract subjects and mathematics. It supported the practice of the Tuwali language in Mathematics instruction because it benefits student learning and participation.

Learning is a socially mediated process according to the sociocultural theory of Vygotsky (1978), since language functions as a crucial element in mental growth. Employing educational methods through student-friendly languages creates better understanding and knowledge maintenance, which leads to upgraded academic results.

In addition, translanguaging is an effective teaching practice that enables students to utilize their entire linguistic capability, according to García and Wei (2014). Their study showed that bilingual and multilingual students achieve maximum educational success when learning with their first language and second language instruction.

The Organisation for Economic Co-operation and Development (OECD, 2019) further demonstrated how students learn mathematics and other subjects at higher levels when taught through their native language. UNESCO (2016) stressed that mother-tongue-based multilingual education (MTB-MLE) enhances learning results while reducing educational gaps.

Conclusions and Recommendations

Based on the findings elucidated in this study, these conclusions were drawn. The students view Tuwali language instruction in Mathematics as favorable because it improves their understanding alongside both cognitive capabilities and involvement in the classroom. Nevertheless, gender gaps were identified, showing that female students demonstrated a more favorably received Tuwali instruction method compared to the opinions of male students. Moreover, the students showed a "Fairly Satisfactory" academic performance level in Mathematics, which points to instructional areas that demand further attention. However, the study established a significant positive association between Tuwali-based instruction benefits and Math performance, but the general impact on student learning was moderate.

Schools shall enhance teacher capabilities by implementing frequent training programs, Learning Action Cells (LAC), and mentoring services that prioritize executing effective mother-tongue-based teaching methods. The elimination of gender-based learning reluctance requires specific actions through group discussions focusing on male students along with interactive instructional practices and the integration of male mentors and role models to expand acceptance. Improving mathematics achievement among students requires educational institutions to establish Tuwali-based remediation programs with contextual learning materials that include practical examples and translanguaging strategies for bilingual teaching methods. Future research must analyze the effects of Tuwali instruction on problem-solving ability and higher-order thinking at different academic levels through investigations that explore social influences on language-based learning gender gaps. Tuwali instruction requires institutional backing for sustainability by building support for its official placement in schools, financial resources, and local

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community collaboration. Educational measures established by teachers will help reduce gender imbalances in math study while boosting student dedication and achievement through culturally sensitive educational techniques.

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