



EFFECT OF USING THE TETUN LANGUAGE IN TEACHING RATIONAL NUMBERS ON STUDENTS' MATHEMATICS LEARNING ACHIEVEMENT

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ABSTRACT

The aim of this research is to analyze the effect of using the Tetun language in teaching rational numbers on the mathematics learning achievement of 8th-grade students at *Ensino Básico Filial 30 Cíclo Bucoli*. This study employs a quantitative method with a sample of 35 participants. The results indicate that the data follow a normal and linear distribution. Furthermore, the hypothesis test results indicate that the use of the Tetun language significantly influences students' mathematics achievement.

INTRODUCTION

Learning is an educational activity that involves interaction between teachers and students. Teachers are responsible for delivering instructional content, while students are expected to acquire relevant knowledge (Ordu, 2021). Learning occurs when learners are mentally engaged and actively construct knowledge through interaction with their environment (Saleem et al., 2021). In this process, the teacher plays an essential role as a facilitator, guiding and supporting students in achieving learning objectives.

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In the pedagogical context, social interaction and language play a fundamental role in students' cognitive development (Remorosa et al., 2024). In Timor-Leste, teachers are required to apply instructional methods that provide students with opportunities to learn not merely through memorization, but through engagement and active participation. Learning becomes effective when adequate conditions are present, including appropriate learning facilities and a language of instruction that students can understand (Grafton, 2021).

Mathematics plays an important role in everyday life, providing a foundation for problem-solving, logical thinking, and rational decision-making. According to Borba & Goi (2021), effective learning occurs when students can construct mathematical concepts through manipulation and exploration. However, in Timor-Leste's educational context, students face significant challenges, particularly in subjects such as mathematics. Many students struggle to understand the content because it is delivered in an unfamiliar language and with teaching methods that are not aligned with their cognitive level.

Linguistic communication in the classroom is an influential factor that directly affects the learning process. According to Cummins (2022), when learners do not master the language of instruction, the learning process may be constrained. In Timor-Leste, the education system uses two official languages, Tetun and Portuguese, to expand access to academic content. However, using a non-dominant language can limit students' understanding, as at the basic education level, many students do not yet master the language of instruction used in textbooks, assessments, or teachers' explanations.

Teachers, as the main agents in education, have an obligation to adapt instruction to students' linguistic and cognitive realities. According to Prates et al. (2023), a comparative analysis of the curriculum and teaching materials used from basic to secondary education in Timor-Leste revealed significant differences in the language of instruction. At the secondary level, Portuguese is the predominant language, whereas in Cycles 1, 2, and 3, mathematics is taught in Tetun. This transition may have a psychological impact on students, as they are required to adapt to a new language at a critical stage of their learning development.

Based on the problems described above, this study aims to determine whether

the use of Tetun in mathematics instruction on rational numbers influences students' learning achievement.

METHOD

This research was conducted at *Ensino Básico Filial 30, Cíclo Bucoli*, and involved eighth-grade students. The study population consisted of 35 students. Because the population size was fewer than 100, all students were included as the research sample. A population refers to the entire group of objects, individuals, or measurements under study (Bengana, 2025). A sample, on the other hand, is a subset of the population selected for research purposes (Casteel & Bridier, 2021). When the population size is fewer than 100, it is advisable to include the entire population to classify the study as a population study (Puspitasari et al., 2024).

Data for this study were collected through observation, questionnaires, and documentation. According to Uwamusi & Ajisebiyawo (2023), observation is a data collection technique used for research purposes to identify the population and sample. Suharni (2021) defines a questionnaire as a data collection technique consisting of a set of questions or statements administered to respondents for them to answer. Documentation, meanwhile, is a technique used by researchers to obtain direct data from the research site (Nikmah, 2020).

The data analysis techniques used in this study included validity and reliability tests, normality tests, linearity tests, autocorrelation tests, heteroskedasticity tests, and hypothesis testing. According to Rahman & Cahyaka (2022), validity is a measure of the degree of accuracy or confidence in a research instrument. An invalid instrument has low accuracy. Reliability, on the other hand, refers to the consistency of an instrument in measuring a particular phenomenon or reality.

RESULT AND DISCUSSIONS

Test of Validity and Reliability

The results of the validity and reliability tests indicate that the questionnaire items for both the Tetun language usage and mathematics learning achievement variables are valid and reliable (Brito & Da Costa, 2024). Specifically, the validity test showed that all calculated r-values exceeded the critical r-values in the r-table.

Furthermore, the reliability test yielded a Cronbach's Alpha coefficient of 0.7 or higher. As noted by Rahayu et al. (2024), establishing empirical validity requires piloting the instrument with a separate group from the actual study sample. The detailed results are presented below.

ValidityTest	ValidityTest	ValidityTest	ValidityTest
No.	r-values	r-table	Conclusion
1	0,495	0,344	Valid
2	0,612	0,344	Valid
3	0,605	0,344	Valid
4	0,825	0,344	Valid
Reliability Test	Reliability Test	Reliability Test	Reliability Test
Cronbach's Alpha	Cronbach's Alpha	Standard Reliability Thresholds	Conclusion
0.751	0.751	0.7	Reliable

Table 1. Results of the Validity and Reliability Test for Using the Tetun Language Variable

ValidityTest	ValidityTest	ValidityTest	ValidityTest
No.	r-values	r-table	Conclusion
1	0,793	0,344	Valid
2	0,562	0,344	Valid
3	0,382	0,344	Valid
4	0,665	0,344	Valid
5	0,695	0,344	Valid
6	0,704	0,344	Valid
Reliability Test	Reliability Test	Reliability Test	Reliability Test
Cronbach's Alpha	Cronbach's Alpha	Standard Reliability Thresholds	Conclusion

0.756	0.756	0.7	Reliable
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Table 2. Results of the Validity and Reliability Test for the Mathematics Learning Achievement Variable

Normality and Linearity Test

Before performing the main analysis to determine the influence of the independent variable on the dependent variable, preliminary assumption tests were conducted to assess normality, homogeneity, and linearity. According to Rahman & Muktadir (2021), these tests are required criteria for ensuring the validity of Pearson correlation and linear regression analyses.

Test of Normality

Tests of Normality	Tests of Normality	Tests of Normality	Tests of Normality	Tests of Normality	Tests of Normality	Tests of Normality
	Kolmogorov-Smirnova	Kolmogorov-Smirnova	Kolmogorov-Smirnova	Shapiro-Wilk	Shapiro-Wilk	Shapiro-Wilk
	Statistic	Df	Sig.	Statistic	Df	Sig.
Using the Tetun Language	.174	35	.009	.954	35	.155
Mathematics Learning Achievement	.242	35	.000	.800	35	.056
a. Lilliefors Significance Correction	a. Lilliefors Significance Correction	a. Lilliefors Significance Correction	a. Lilliefors Significance Correction	a. Lilliefors Significance Correction	a. Lilliefors Significance Correction	a. Lilliefors Significance Correction

Table 3. Result of Normality Test

The normality of the two variables was assessed using the Shapiro-Wilk test, as the sample size in this study was less than 50. This choice is consistent with Hernandez's (2021) recommendation that the Shapiro-Wilk test is the most powerful method for detecting departures from normality in small samples. The results indicate that both variables are normally distributed, as evidenced by the significance values of 0.155 ($p > 0.05$) for the Tetun Language variable and 0.056 ($p > 0.05$) for the Mathematics Learning Achievement variable. These findings satisfy the assumption of normality, allowing the analysis to proceed to the linearity test.

Test of Linearity

The results of the linearity test, based on the Deviation from Linearity significance value, yielded a value of 0.622. Compared to the significance level of 0.05, this indicates a linear

relationship between Mathematics Learning Achievement and the use of the Tetun Language, as the significance value is greater than 0.05 ($0.622 > 0.05$). According to Field (2018), a non-significant result ($p > 0.05$) in the deviation-from-linearity test indicates that the relationship between the independent and dependent variables is adequately described by a linear model. Therefore, the analysis can proceed to hypothesis testing.

ANOVA Table	ANOVA Table	ANOVA Table	ANOVA Table	ANOVA Table	ANOVA Table	ANOVA Table	ANOVA Table
			Sum of Squares	df	Mean Square	F	Sig.
Mathematics Learning Achievement*Using the Tetun Language	Between Groups	(Combined)	106.971	8	13.371	2.208	.061
Mathematics Learning Achievement*Using the Tetun Language	Between Groups	Linearity	74.615	1	74.615	12.323	.002
Mathematics Learning Achievement*Using the Tetun Language	Between Groups	Deviation from Linearity	32.356	7	4.622	.763	.622
Mathematics Learning Achievement*Using the Tetun Language	Within Groups	Within Groups	157.429	26	6.055		
Mathematics Learning Achievement*Using the Tetun Language	Total	Total	264.400	34			

Table 4. Result of Linearity Test

Test of hypothesis

The analysis results presented in the table indicate a significance value of 0.001. When compared to the alpha level of 0.05, the result shows that $0.001 < 0.05$. (Brito & da Costa, 2024) Therefore, it can be concluded that the use of Tetun has a significant impact on mathematics achievement. This finding is consistent with Peng et al. (2020), who argue that instruction in a learner's native language significantly enhances the comprehension of mathematical concepts and improves overall academic performance.

Coefficient sa	Coefficient sa	Coefficientsa	Coefficientsa	Coefficient sa	Coefficient sa	Coefficient sa
Model	Model	Unstandardized Coefficients	Unstandardized Coefficients	Standardized Coefficients	t	Sig.

Model	Model	B	Std. Error	Beta	t	Sig.
1	(Constant)	13.107	3.437		3.814	.001
1	Using the Tetun Language	.752	.209	.531	3.602	.001
a. Dependent Variable: Mathematics Learning Achievement	a. Dependent Variable: Mathematics Learning Achievement	a. Dependent Variable: Mathematics Learning Achievement	a. Dependent Variable: Mathematics Learning Achievement	a. Dependent Variable: Mathematics Learning Achievement	a. Dependent Variable: Mathematics Learning Achievement	a. Dependent Variable: Mathematics Learning Achievement

Table 5. Result of Hypothesis Test

CONCLUSIONS

Based on the research findings and analysis, it is concluded that the use of the Tetun language significantly influences the mathematics learning achievement of 8th-grade students at the *Ensino Básico Filial 30^o Ciclo Bucoli*.

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