



Influence of the Cooperative Method on the Development of Students Multiplication Capacity in Mathematics Lessons: A Quantitative Study in Timor-Leste

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ABSTRACT

The research investigated the effects of the Cooperative Learning Method (CLM) on the multiplication ability of the students in primary mathematics classrooms in Timor-Leste. The study employed the quantitative design with a total sample of 86 students: 41 students of EBC Maria Auxiliadora as the instrument validity test and 45 students of EBC Cycle 3 Biadila Cailaco school as the primary data. The information was gathered by using a designed questionnaire and a multiplication test and evaluated with the help of SPSS in terms of validity and reliability testing, the determination of normality, and simple linear regression. The results indicate a substantial positive impact of CLM on the ability of students to multiply, as the t-count of 2.986 is greater than the t-table of 1.681. The findings show that cooperative learning is effective in promoting the engagement and conceptual and collaborative problem-solving abilities of students. The research arrives at a conclusion that CLM is a topical and efficient method of pedagogy to enhance mathematical learning outcomes in Timor-Leste and suggests continuous teacher training as well as instructional support as the means of the successful application of this method in the classroom

INTRODUCTION

Using a variety of methods in teaching mathematics is crucial for developing students' capacity for the multiplication concept. Being a post-conflict country and attempting to achieve sustainable development, Timor-Leste takes education as a crucial basis of the national reconstruction, human resources building, and social change. Although the quality of education at the national level is being enhanced, the primary schools experience learning and teaching processes that are limited by several systemic and pedagogical problems. Ximenes (2024) notes that the effectiveness of teachers in Timor-Leste is also determined by a complex of factors related to each other, such as the quality of teacher preparation, access to ongoing professional development, access to teaching materials, support of the school leadership, and the work environment in general. These factors directly influence teachers' capacity to implement innovative, student-focused pedagogies that foster active learning. Moreover, according to Ximenes (2025a), even well-trained ICFP graduate teachers who exhibit better pedagogical competence are unable to plan and implement effective lessons due to insufficient instructional materials, overcrowded classrooms, and an inconsistently implemented curriculum.

The introduction of the 2014 Primary Education Curriculum further complicates teaching practices. Ximenes (2025b) asserts that teachers occasionally face challenges in comprehending the competency-based principles of the curriculum, aligning learning goals with appropriate instructional methods, and planning classroom activities that promote active learning. Consequently, several teachers tend to go back to old-fashioned methods of teaching and lecturing that emphasise memorising rather than learning. This trend does not give the student the chance to think at a higher level, learn collectively, and solve problems, the skills needed when learning mathematics.

One of the fields where these pedagogical obstacles have manifested themselves is mathematics, especially multiplication. Understanding multiplication is a precursor to further complex mathematical ideas about division, fractions, algebra, and problem solving. Nevertheless, the concept of multiplication is common among many primary students in Timor-Leste because of uninspiring teaching techniques, little interaction with students, and little practical work. The traditional methods usually focus on memorisation and not on conceptual comprehension, which causes superficial learning and prolonged complications (Akmal, 2021). Another thing that Astuti and Gunawan (2017) note is that passive learning conditions are also the cause of low motivation and poor mathematical performance.

Learner-centred approaches, like the Cooperative Learning Method (CLM), have been highly supported internationally and regionally to address these challenges. Cooperative learning focuses on sharing and supporting each other, collective responsibility, and interaction between peers. Cooperative learning improves academic performance and positively affects social skills, critical thinking, and positive attitudes to learning (Cheng, 2023). On the same note that cooperative learning can considerably decrease the challenges in

learning multiplication because it allows students to communicate, investigate, and develop mathematical concepts together (AbdAlgani, 2021).

In the Timorese case, the implementation of cooperative learning is consistent with wider reforms in education to reinforce active learning, inclusive pedagogy, and the improvement of mathematics. The recent changes in the technical world further demonstrate the importance of interactive and adaptive pedagogies. The implementation of artificial intelligence in mathematics learning highlights the idea that AI-aided tools like AI-supported learning platforms, collaborative online learning platforms, and automated feedback systems will bring new possibilities to enhance student conceptual learning (Ximenes, 2025c). Although the integration of AI in Timor-Leste is relatively recent, the review illustrates the importance of pedagogical approaches that place a stronger emphasis on interaction, collaboration, and active engagement principles that are core values of cooperative learning.

Considering these pedagogical gaps and innovation opportunities, this paper explores how the Cooperative Learning Method could affect the growth of the multiplication ability of students in Timor-Leste primary mathematics classes. The relationship between collaborative learning and mathematical development may facilitate or limit the mathematical development; thus, understanding collaborative learning is critical in guiding teachers' practice, curriculum application, and policy formulation to enhance the quality of mathematics education in the country. Consequently, this research seeks to investigate how the cooperative learning method affects building multiplication ability in mathematics classes among students. In particular, the research will aim at ascertaining whether cooperative learning has a significant contribution to the multiplication performance of the students and also to identify the factors that can affect the effectiveness of cooperative learning in the classroom.

To guide this research, the following hypothesis is designed:

- H1: The cooperative learning method positively affects the multiplication ability of students in math classes significantly.
- H0: There is no significant difference in the multiplication capacity of students using the Cooperative Learning Method.

LITERATURE REVIEW

The research-based cooperative learning technique was invented and developed in the early 1970s by Eliot Aronson and students from the University of Texas and the University of California. Since 1971, billions of classrooms have used cooperatives, and they have been a tremendous success" (Aronson, cited in Benton, 2016). The cooperative method is a learning approach that emphasises cooperation among students in small groups to achieve common learning goals.

According to Johnson and Johnson (2015), cooperative learning can improve academic achievement, social skills, and positive attitudes toward learning through students working on group activities. According to Nababan, Simorangkir & Pardede (2023), the cooperative method is a measure of a group that includes four or six people in the group with questions on different subjects. In the discussion, the teacher can discover the students' ability to work in groups.

In the context of mathematics learning, Cheng (2023) stated that cooperative learning can increase learner motivation and learning outcomes, as students feel more involved and responsible for their own learning and that of their friends. The cooperative method is important because, through group work, it can facilitate students exploring thoughts and ideas within the group, according to Sulistio and Haryanti (2022).

Cooperative Method Implementation

The cooperative method is a structured stage of cooperation, and each element of a group has the responsibility to study and form valuable arguments, as well as from other groups, about important parts of the lesson (Martinis, 2015). Furthermore, to start with the cooperative method, teachers must provide clear instructions and guidance so that students do not have doubts when students start working in groups. In this part, the teacher must demonstrate a willingness to teach and exhibit exemplary behaviour to effectively guide students through the structured stages that have been prepared. Jesmita (2019) confirmed that the steps implemented in the cooperative method are as follows: Teachers transmit learning objectives by demonstrating materials, forming groups to guide students, and finally evaluating the results while providing applause and motivation for the work students have done, which contributes to their learning process.

The key point is that when teaching, teachers must explain and provide clear instructions to students regarding the services they are expected to perform. As a teacher needs to plan the classroom well and dignifiedly to provide a favourable environment for students when learning a lesson (Ximenes, 2024). Furthermore, the teacher divides the students into groups to do the work; the teacher must control and guide the students so that they do not relax. The teacher is also fully qualified to assess students and must be inventive in praising them to avoid bias and stress.

The cooperative method was implemented in three steps: skills and habits, knowledge and understanding, and attitudes and ideas. Each type of learning outcome can meet the subjects in the curriculum (Kingsley & Sudjana, 2015). This stage of teaching aims to improve students' practical skills and establish important habits for both individuals and groups when implementing cooperative methods. It can also increase students' knowledge and understanding based on the method presented, contribute to and develop students' and teachers' capacity to entertain new ideas and constructive attitudes, and innovate something in their learning process.

According to Isjoni (2015), the steps used in the cooperative method are as follows: First, divide students into groups of 4-6 people; second, assign specific tasks for each group to complete during a meeting to help them develop their chosen topic. This stage fosters the development of students' independent and collaborative thinking skills. Students are creative and able to do something new in their learning process, and they can support each other with different ideas and give appropriate results. The steps implemented ensure that students are active in their learning process and can innovate by learning from each other during their development stage.

Cooperation Method Effect on Multiplication Skills

The learning process is a process that takes place between the teacher and the student in the learning classroom. According to Widoyo et al. (2023), the learning process cannot be separated because the teacher enlightens lessons, and the students receive lessons from the teacher himself. The method itself is called the learning interaction method. In learning, teachers seek various strategies for students through methods that can facilitate understanding the lesson quickly. According to Sujatha & Vinayakan (2022), cooperative methods can increase all aspects of student engagement, which in turn can improve their understanding of the material, including multiplication skills. To determine the student's ability, first do a simple test with the subject of multiplication operations. When the majority of students know the test, it means that their teacher is applying the teaching system well.

This method encourages students to work in teams in a group to solve mathematical problems together. According to Rusman (2015), the discussion method shows a positive influence on students' learning when the teacher organises students in groups to work together, continues to monitor and provides them the opportunity to share ideas to solve problems offered by the teacher. This part can ensure students achieve learning goals through group work and show effective collaboration in the learning process. Through this method, students have the initiative to collaborate together to increase their capacity to perform multiplication operations (Maulidawati et al., 2020). Cooperative methods can also stimulate students to share knowledge or learn from each other. Through this process they can work together to provide solutions to the problems offered by the teacher so that all students can understand the concepts (Sujatha & Vinayakan, 2022). When used well in class, cooperative methods can encourage students to learn from and work with each other.

Student Engagement in Learning

Student engagement in learning refers to the student's active participation in the learning process, both physically and mentally. The research results from Cheng (2023) showed that students who study using cooperative methods have better achievement compared to students who study alone. This study also found that cooperative methods can improve students' social and communication skills. Rahmawati (2018) stated that the implementation of cooperative methods in learning mathematics can improve students' ability to solve multiplication problems. The results of the study indicated that students who studied using the cooperative method scored higher on math skills tests compared to students who used the conventional method (Viyayanti & Dwikoranto, 2021). Implementation of this method can affect the development of students' learning when teachers organise and involve students actively in group learning activities.

METHODOLOGY

The research methodology used in this study is quantitative, and it aimed to collect data and analyse the impact of the teacher's cooperative method on developing students' multiplication skills at the grassroots level. The statistical inferential method was applied to explore the influence of the implementation of the cooperative method by teachers and students' multiplication skills in grade VIII of Central Primary School - Biadila. Data were collected through a questionnaire measuring the implementation of cooperative methods and a multiplication skills test. The researcher used the inferential statistical method with the reason to measure the cooperative method as the independent variable (X) and the ability of multiplication operations as the dependent variable (Y). This method uses a statement with a model questionnaire prepared by the researcher to distribute to respondents.

Population and Sampling

A population is a general area consisting of objects and subjects that have certain qualities and characteristics determined by researchers to study and then draw conclusions (Sugiyono, 2017). The population of this research to be used for the main data collection is the students of EBC School - Cycle 3 Biadila Cailaco, which accumulated from grades 7 to 9 with a total of 235 students, including one hundred and eight (108) males and one hundred and twenty-seven (127) females. Therefore, the researcher selected EBC School as the population for this study to examine how teachers' cooperative methods influence the development of students' multiplication skills in mathematics lessons. In this research, the main subject of the validity test data is the students from EBC School. The school, Mary Help of Christians, has a total population of two hundred and seventy-five (275).

The research target is a small portion of the population, known as a sample. If the population is over 100, sample 10-15% or 20-25% or more; if it's under 100, take all (Lohr, 2021). The sample for testing the validity of the data in this research was taken from forty-one (41) students from the total population of two hundred and seventy-five (275) in EBC Maria Auxiliadora School. Therefore, the researcher determined that the total sample should represent 16% of the total population. As a result, the chosen sampling technique can significantly influence the research outcomes. According to Sugiyono (2017), choosing a representative sample of the population can affect the validity and reliability of the research results, while Arikunto (2015) argues that the right sample size can increase the accuracy of the estimation of population characteristics.

The sampling technique adopted by the researcher is simple random sampling. According to Cohen, Manion & Morrison (2017), simple random sampling is a sample selection method where members of the population have an equal chance of being included in the research. The researcher took another sample from the school EBC Cycle 3 Biadila Cailaco to correlate the main data, making the school the target site for this research. The sample consists of 45 students from grades 7 to 9, selected from a total school population of two hundred and thirty-five (235). Therefore, a sample of 19 per cent (19%) of the total population (students) in the school was taken to obtain the main data in this research. Furthermore, the main data technique used to select the sample is non-probability sampling.

Data Collection Techniques

Data collection techniques in quantitative research can be done through a variety of methods, including experiments, surveys, and analysis, which serve to measure and determine the amount of data needed (Cohen et al., 2017). The importance of the assumption that subjects, or respondents, are individuals who understand themselves best when using interview and questionnaire techniques. Therefore, the researcher chose the questionnaire survey technique as the method of data collection. This technique was chosen because it allows searching to obtain accurate, clear, relevant, and credible data, according to the research objectives that have been established.

Questionnaire

The researcher used this questionnaire technique because it is very appropriate to measure and collect data on the relationship between the independent variable (X) and the dependent variable (Y). A questionnaire is a data collection technique through questions or statements related to the research problem, then an orderly or systematised response to the problem. According to Sugiyono (2018), the Likert scale is used to measure the attitudes, opinions and perceptions of a person or group regarding social phenomena. Similarly, the Likert scale uses some questions to measure an individual's behaviour in response to four categories (4), namely strongly agree (4), agree (3), disagree (2), and strongly disagree (1). Each item can reflect the individual's characteristics, such as knowledge, attitude, and behaviour. This scale can be measured by selecting prepared alternative answers. Thus, according to Fink (2017), direct distribution is the questionnaire delivered directly to the participants by the researchers. Therefore, the researcher used direct distribution to observe the respondents' availability to complete the distributed questionnaires, ensuring accurate data collection. Additionally, the process of using questionnaires to collect data for validity testing and primary data is outlined. The participants have 40 minutes to fill the questionnaire, then researchers collect them to further process of analysis.

Data Analysis Techniques

In this research, the researcher used an inferential statistical analysis technique. Inferential statistical analysis techniques are statistical methods that use sample data to make estimates, decisions, predictions, or generalisations about a larger collection of data (Cohen et al., 2017). Quantitative differential data analysis focuses on comparing numerically measurable variables to determine significant differences. This technique is often used in decision-making to evaluate the impact of certain changes on the outcome.

To use quantitative differential data analysis techniques, first identify the variables you want to compare. Then, using regression analysis helps to understand the influence of one variable on another, that helped by SPSS27 (Statistical Package for Social Science). Therefore, the simple regression analysis of t-tests was used to determine the influence of the cooperative method on students' development of geometric concept understanding.

Validity Testing

Validity testing is an important step in the development of measurement instruments to ensure that the data produced are reliable and valid. These data are usually in the form of questions or statements given to respondents using questionnaires with the objective of expressing an idea (Cohen et al., 2017). In conducting this validity test, the researcher used her own criteria that determined the validity of the items. Researchers can determine whether the data from each instrument is valid or invalid in two ways. First, if the significance value is < 0.05 , then the data is valid, but if the significance is > 0.05 , then the data is invalid. Another way is to compare the r-count (Pearson correlation value) with the r-table (from the r-table). Thus, if the r-count value $>$ r-table, then the item is valid; if r-count $<$ r-table, the item is invalid. This phase is part of the process of analysing the data for the test before going to the field to continue the main data collection (Cohen et al., 2017).

Reliability Testing

In research, the reliability test of the data is crucial to guarantee consistency and reliability of the data (Noor & Fuzi, 2025). In the context of confidentiality, maintaining the confidentiality of respondents' data is important to ensure that they feel safe and comfortable providing accurate information. If individuals feel their data is exposed, they may provide dishonest answers, affecting research validity. Thus, a reliable instrument can repeatedly measure the same object and produce the same data. Therefore, the reliability test of these instruments is conducted with internal consistency, such as testing the instrument only once, according to the analysis of data obtained with certain techniques (Noor & Fuzi, 2025).

The results of this analysis can be used to determine the reliability of the instrument. Therefore, the reliability of the instruments can be tested with the help of SPSS21. This method is essential to determine if the instrument is reliable or needs adjustment (Cohen et al., 2017). To determine whether the instrument was reliable or not, the interpretation of the Cronbach's alpha values was used. To determine the reliability results, follow the criterion outlined by Cohen et al. (2017), if the value of Cronbach's Alpha (r-count) is greater than the r-table value, then the research instrument is considered reliable; conversely, if it is less than the r-table value, the instrument is deemed unreliable.

Another part is to determine the level of reliability with a criterion that if the Cronbach Alpha value is less than the value of 0.6, the instrument is considered to have low reliability (Noor & Fuzi, 2025). This means that test items may not correlate well, and therefore, the test may not be a satisfactory measure of the concept it is intended to assess. This criterion applies to values within the range of 0.6 to 0.79. Cronbach's alpha values in this range were considered acceptable. This amount indicates that the test has reasonable internal consistency and is usable, although there may be room for improvement. Values between 0.8 and 1: Cronbach's alpha in this range is considered high. This rating suggests that the instrument has excellent internal consistency and that the items are highly correlated with each other, indicating that the test is reliable and original in measuring the intended concept (Cohen et al., 2017).

Data Normality Test

Data normality tests are important because the data shared is usually considered representative of the population. Therefore, in this research, the normality test was conducted with the one-sample Kolmogorov-Smirnov test, with the help of SPSS21. Determine the normality of the data distribution, and make a comparison between the significance value and the value of 0.05 (Noor & Fuzi, 2025). Therefore, if the significance value is < 0.05 , the data are not normally distributed. However, if the significance value is > 0.05 , the data is normally distributed. The result of this test can determine the data analysis with parametric or non-parametric methods.

Simple Linear Regression Analysis

Simple linear regression is a statistical method used to analyse the relationship between two variables, namely an independent variable (predictor) and a dependent variable (response) (Pal & Bharati, 2019). The goal is to find a linear relationship between the two variables. Identify whether the independent variable has a significant influence on the dependent variable. The regression coefficient (b) shows how the dependent variable (Y) changes when the independent variable (X) changes by one unit.

Hypothesis Proof

Hypothesis testing is a statistical method used to test the truth of a statement or hypothesis about a population parameter based on sample data. The null hypothesis (H_0) is that there is no significant influence of the teacher's cooperative method on the development of students' multiplication capacity. The alternative hypothesis (H_1) is that there is a significant influence of the teacher's cooperative method on the development of students' multiplication capacity.

Ethical Considerations

In the context of research, ethical considerations also include the protection of research subjects, data integrity, and social responsibility. Therefore, before conducting this research, the researcher sent a letter of research acknowledgement to the school that conducted the research. This gesture shows that the institute and the school agree and collaborate to conduct research. Ensure the confidentiality of participants' personal data and refrain from disclosing gathered information without permission. Researchers should report research results honestly, without manipulating data or results. Maintain open and honest communication between all parties involved in the research to avoid conflicts and misunderstandings. Etiquette in research is essential for maintaining scientific integrity, protecting the rights and welfare of participants, and ensuring that research results are credible and beneficial to society.

RESULT**Validity Test Results**

The following table presents the results of the empirical validity test for the 18-item questionnaire using Pearson's correlation helped by the SPSS program. This test was conducted to ensure the quality and consistency of the research instrument.

Table 1. Validity Test Results

Variable	Test method	T-count	T-tabel	Description
X1	Pearson Correlation	0,255	0,294	invalid
	Sig. (2-tailed)	0,091	0,05	
	N	45		
X2	Pearson Correlation	0,367*	0,294	Valid
	Sig. (2-tailed)	0,013	0,05	
	N	45		
X3	Pearson Correlation	0,339*	0,294	Valid
	Sig. (2-tailed)	0,023	0,05	
	N	45		
X4	Pearson Correlation	0,248	0,294	Invalid
	Sig. (2-tailed)	0,100	0,05	
	N	45		
X5	Pearson Correlation	0,437**	0,294	Valid
	Sig. (2-tailed)	0,003	0,05	
	N	45		
X6	Pearson Correlation	0,033	0,294	Invalid
	Sig. (2-tailed)	0,827	0,05	
	N	45		
X7	Pearson Correlation	0,503**	0,294	Valid
	Sig. (2-tailed)	0,000	0,05	
	N	45		
X8	Pearson Correlation	0,230	0,294	Invalid
	Sig. (2-tailed)	0,128	0,05	
	N	45		
X9	Pearson Correlation	0,350*	0,294	Valid
	Sig. (2-tailed)	0,018	0,05	
	N	45		
Y1	Pearson Correlation	0,149	0,294	Invalid
	Sig. (2-tailed)	0,328	0,05	
	N	45		

Y2	Pearson Correlation	0,172	0,294	Invalid
	Sig. (2-tailed)	0,258		
	N	45		
Y3	Pearson Correlation	0,427**	0,294	Valid
	Sig. (2-tailed)	0,003	0,05	
	N	45		
Y4	Pearson Correlation	0,498**	0,294	Valid
	Sig. (2-tailed)	0,000	0,05	
	N	45		
Y5	Pearson Correlation	0,392**	0,294	Valid
	Sig. (2-tailed)	0,008	0,05	
	N	45		
Y6	Pearson Correlation	0,356*	0,294	Valid
	Sig. (2-tailed)	0,016	0,05	
	N	45		
Y7	Pearson Correlation	0,538**	0,294	Valid
	Sig. (2-tailed)	0,000	0,05	
	N	45		
Y8	Pearson Correlation	0,394**	0,294	Valid
	Sig. (2-tailed)	0,007	0,05	
	N	45		
Y9	Pearson Correlation	0,307*	0,294	Valid
	Sig. (2-tailed)	0,040	0,05	
	N	45		

The results of the validity test, as presented in this table, indicate that some items are not valid. There are 6 invalid items and 4 items from variable X: X1 with a count value of 0.255, X4 with a count value of 0.248, X6 with a count value of 0.033, and X8 with a count value of 0.230. Item 2 of the dependent variable is Y1 with a count value of 0.149 and variable Y2 with a count value of 0.172. Therefore, these values are considered invalid because the value of $r\text{-count} < r\text{-table}$ is 0.294. There are other items of both variables considered valid, all because the value of $r\text{-count} > r\text{-table}$.

Reliability Test Results

The following table presents the results of the reliability test using SPSS27 and the Cronbach's alpha technique. The reliability results reported in this table show that the Cronbach Alpha value results of $0.322 > 0.294$ mean the items are reliable, because the value of Cronbach Alpha determined by the SPSS program shows the value of Cronbach Alpha $>$ the t-table value. Thus, based on the Cronbach's alpha criterion, the items were all reliable.

Table 2. Reliability Statistics

Reliability Statistics		Value	Description
Cronbach's Alpha	N of Items	R-table	Decission
0,322	18	0,294	Reliable

Test of normality

The following table reports the results of the normality test using the One-Sample Kolmogorov-Smirnov Test.

Table 3. Normality Test Results

One-Sample Kolmogorov-Smirnov Test		
Asymp. Sig. (2-tailed)	Significance level	Decission
0,000	0,05	Normal distribution

The one-sample Kolmogorov-Smirnov test results indicated that the two-tailed significance value was 0.000. The table also shows that the value for the significance level is 0.05. The decision column shows the normal distribution results. The determination of normality results is based on the criterion that the significance value being lower than the significance level value means normal data distribution. Therefore, a value of $0.000 < 0.05$ based on the data criteria ensures a normal distribution.

Simple Linear Regression Analysis

The following table reports the results of simple linear regression analysis using the SPSS program.

Table 4. Simple Linear Regression

Coefficient			
Variable	t-count	T-table	Decission
Cooperative method	2,986	1,681	Influence
Dependent variable: student capacity of Multiplication			

The results of the simple linear regression analysis in this table demonstrate that the t-count value is 2.986. In addition to this table, the value of the t-table is 1.681. Therefore, according to the established criteria for comparing the t-table value and the t-count value, researchers observe that the t-count value of 2.986 is greater than the t-table value of 1.681. This result indicates that variable X shows a positive influence on variable Y. The simple regression analysis results of the hypothesis test showed an influence between the variables. Therefore, hypothesis (H1) is accepted because $t\text{-count } 2.986 > t\text{-table } 1.681$ means the teacher's cooperative method influences students to develop students' ability to perform multiplication operations in mathematics lessons.

DISCUSSION

The cooperative learning method has a positive relationship and exerts a significant influence on multiplication ability, which indicates that this method is effective in improving learners' ability. In this research, it is also shown that students' motivation to learn well is caused by the students themselves and comes from the teacher's teaching strategy. This result is in line with the research results of Cheng (2023) that when students demonstrate higher motivation through working together, they can achieve learning objectives effectively. Thus, well-motivated learners experience positive developments in their skills. Therefore, motivation is a crucial element in determining learning outcomes. This study demonstrates that both the students' self-motivation and the teacher's teaching strategy contribute to positive student learning motivation. Thus, well-motivated learners experience positive development in their abilities.

Motivation is a crucial element in determining learning outcomes. The results of the study indicate that the implementation of the cooperative method by teachers has a significant and positive influence on enhancing students' multiplication capacity. This finding is consistent with the cooperative learning theory proposed by Johnson & Johnson (2015) which states that group collaboration can enhance students' conceptual understanding and learning outcomes.

When teachers implement the cooperative method, students are encouraged to interact, discuss, and help each other understand the concept of multiplication. Struggling learners can receive peer assistance, while more capable learners can strengthen their understanding by explaining concepts to others. It aligns with Martinis' (2015) statement that the cooperative method encourages individual and group responsibility in the learning process. Cooperative learning theory, according to Johnson & Johnson (2015), also lends support to this outcome through the elements of positive interdependence and individual responsibility. Every student must master multiplication, which pushes them to actively participate and take responsibility for their learning to ensure study success.

Based on the results of research and literature, the cooperative method is not the only factor that determines students' ability to perform multiplication operations. However, there are other factors that can also play a role, including individual motivations and the quality of teacher presence in facilitating group work activities. Therefore, in order for the influence of the cooperative method

to remain significant, teachers must continue to use it to promote the quality of learning the content of multiplication operations.

CONCLUSION AND RECOMMENDATIONS

The results of the simple linear regression test indicated that the cooperative method had a significant and positive influence on students' multiplication capacity. The value of $t\text{-count } 2.986 > t\text{-table } 1.681$ shows statistical proof that the cooperative method positively contributes to students' capacity development and participation in learning. Thus, it is concluded that the alternative hypothesis (H1) is accepted because empirical evidence confirms the existence of a significant relationship between the cooperative method and students' multiplication capacity in mathematics learning.

The results of this research show that the implementation of cooperative methods in mathematics classes provides opportunities for students to learn from collective interaction, share ideas, and solve mathematical problems with cooperation. In this context, teachers who apply cooperative strategies can create a motivating and participatory learning environment, helping students develop critical thinking and autonomy in the learning process. Furthermore, this teaching strategy introduces changes to the methodology and transforms the pedagogical interaction in the classroom dynamically.

Often students in mathematics lessons face difficulties in multiplication operations due to a lack of collaboration and often unclear explanations. The implementation of the cooperative method can solve this problem because it provides students the opportunity to learn well. The cooperative method has a positive, significant, and relevant impact on improving students' mathematics learning, which makes an important contribution to pedagogical innovation in primary education in Timor-Leste. Therefore, this research shows that adapting the cooperative method contributes to mathematics learning and can effectively improve students' multiplication abilities. Thus, especially educators should consider integrating cooperative strategies in learning to increase students' motivation and the development of mathematical skills.

Based on the results of the research, the researcher recommends the following important points that contribute to the development of teaching:

1. Teachers who need to teach mathematics training continue to use cooperative methods in learning because this method can help students to learn from each other by sharing their knowledge in group work.
2. School leaders need to coordinate with the municipal and national education directorates to continue to provide training support to teachers on the implementation of cooperative methods effectively. It is also critical for school leaders to provide moral and material support to teachers so that they can use it appropriately in mathematics learning.
3. The Ministry of Education needs to commit to facilitating learning materials and offering high-quality training in teaching methods to teachers in the area of mathematics so that they can realise quality teaching and learning.

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