



TAKALINTAR Learning Media: Supporting Elementary School Students' Counting Skills in Multiplication Materia

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Abstract

This study aims to determine the effectiveness of using the TAKALINTAR learning media in improving multiplication skills in mathematics, especially for third-grade students, and to understand students' responses to the TAKALINTAR learning media. The research method used is quantitative pre-experimental with a one-group pretest-posttest design. The population in this study was 34 third-grade students at SDN Kartini II Cirebon. The research instruments used included arithmetic ability tests, documentation, and interviews. The results showed that the pretest score of 46.47 was lower than the posttest score of 87.65. The Wilcoxon Test result for pretest and posttest data yielded $Asymp. Sig. (2-tailed) = 0.000$, indicating a significant increase in scores. It is concluded that using the TAKALINTAR media is effective in improving students' mathematical abilities, especially in multiplication learning materials in third grade at SDN Kartini II Cirebon. Thus, students' responses to the implementation using the TAKALINTAR learning media show that students feel very happy, enthusiastic, and interested during the mathematics learning process. During the implementation of the TAKALINTAR media, teachers should prepare higher-order thinking skills (HOTS) questions to deepen students' abilities and use group strategies to train students' cooperation in learning.

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INTRODUCTION

Education is one of the supporting factors for the development and progress of a country. Education is a means through which students develop their full potential (Sari & Rusnilawati, 2022). Certainly, there are provisions that can make a community considered educational. A community can be considered educated if it contains a learning process that involves interactions between teachers and students. The aim of such activities is to assist students in conducting their learning activities as effectively as possible to achieve the planned learning objectives (Masdul, 2018). The main principle of education is to use knowledge and technology to improve learning outcomes and effectiveness (Pratama & Setyaningrum, 2018). Learning can be considered effective when there is a two-way relationship between teachers and students, and when it is well-communicated.

One of the basic sciences in education is mathematics, which deals with number operations. Mathematics is also an important science, playing a significant role in technology development and providing essential information for daily life. Purchasing and selling goods in the market are among the functions of mathematics, as defined by (Firdausi & Suparni, 2022), and there are many more in everyday life. Therefore, mathematics will continue to evolve because it is very important and beneficial in all aspects of life, so mathematics should be introduced to students as early as possible, starting from the lowest levels such as elementary school.

Learning is an effort to make students learn, or an activity to teach them (Putri & Kasrman, 2022). Learning will be effective if the learning objectives are achieved and implemented according to the plan (Nasrullah, 2020). Learning can be defined as a deliberate effort to use and involve teachers' professional knowledge to achieve curriculum goals (Prasetyono et al., 2021). Learning is a process designed by teachers to enhance students' intelligence and creativity. Students

must be able to understand mathematics during learning, especially in the field of mathematics (Santoso, 2017).

However, until now, most students still consider mathematics as a very disturbing phenomenon because they do not understand it. According to (Khalimatussakdiyah & Ihtiari, 2021), students have difficulty with mathematics even before they start school, and it becomes a frightening specter because they do not understand the basics of mathematics. Furthermore, based on the conditions during the implementation of the Introduction to Schooling Field II (PLP II) at SDN Kartini II, Kota Cirebon, it was found that many students have difficulty in learning, especially mathematics, particularly in the multiplication operation material. Some factors contributing to this include students having difficulty answering two-digit multiplication problems and beyond, some students being unable to repeat mastery of the multiplication table from 1-10 consecutively, and some students losing memory for the multiplication table between 1-10.

Teachers can only use lecture methods and then write questions on the whiteboard, making students bored, preferring to play alone or chat, and not focusing on listening to the material being presented, due to the lack of diverse learning media. Based on the results of interviews conducted by the author with a third-grade teacher, it was found that he only uses worksheets, student theme books, whiteboards, and PowerPoint presentations based on the textbook content, while the use of other learning media has not yet been implemented. This is as revealed by (Asnawati, 2019). Teachers' media development is still very low, as they usually only use simple materials such as textbooks and photographs but are not yet using more creative ones. That's because teachers are limited in their use of media.

In mathematics, there are operations such as addition, subtraction, multiplication, and division. According to (Winarti et al., 2021), multiplication is basically repeated addition, therefore requiring a good basic

knowledge. Mastering addition is a prerequisite for learning multiplication. It is not surprising that the lack of basic skills, such as multiplication, continues to be a problem in students' learning outcomes. In the early stages of elementary education, physical development always improves, and children's thinking moves from concrete to abstract. This is in line with Jean Piaget's theory, which states that elementary school students are at the concrete operational stage (Arif & Setiyowati, 2017). At the concrete operational stage, children are mature enough to use logical thinking and manipulation, but only in relation to the physical objects present at that time. However, without physical objects or real events in front of them, they will have difficulty solving logical problems (Nuryati & Darsinah, 2021). When faced with concrete or non-abstract objects, children can solve complex problems (Juwantara, 2019).

Learning resources and teaching aids to support educational activities should be carefully considered by teachers as educators (Tafonao, 2018). The solution to overcome student boredom is by using media and teaching aids in learning activities, which provide an engaging and motivating learning experience for students. According to (Umar, 2014), the use of teaching aids and media, both physical and non-physical, is necessary to increase students' interest in learning. Learning media also serves as a bridge between what teachers convey to students. The use of learning media not only facilitates teachers in delivering lessons to their students (Zega, 2022). However, the use of learning media also encourages students to engage in more interactive learning activities in the classroom, enabling feedback from teachers and students. According to (Nurul Audie, 2019), the use of learning media is also very beneficial during learning activities.

Several studies related to mathematics learning media at the elementary school level have been conducted. (Rohaizati et al., 2020) developed comic media that can be considered during the learning process, (Chang, 2021) used AR digital media Method for an

innovative learning environment, (Dinayusadewi & Agustika, 2020) used fun IT-based media such as interactive applications that present images and sounds to increase students' interest in learning, (Greve et al., 2022) The media developed are based on traditional games, such as the game Dakon, which was very popular among children in the 2000s, including E-books which are currently one of the supported and highly sought-after learning media diminati (Nur Afifah Maulidiyyah et al., 2021). In addition to digital media, several other media have also been developed, (Saputra et al., 2019) in their research designed a snakes and ladders media to build understanding of mathematics, (Grafinasari et al., 2019) developed card media, which has been used for multiplication, can improve student learning achievement in that material. The Dakon game learning media proposed by (Ekowati & Suwandayani, 2020) to improve learning in addition, subtraction, multiplication, and division. Learning mathematics will stimulate their thinking capacity and prepare them for the next level of mathematics learning (Syafdaningsih et al., 2021).

Professional teachers must be able to select, develop, and utilize various types of learning media to facilitate the delivery of teaching materials and help students understand the material (Zainil et al., 2018). However, from several previous studies, there has been no development of a smart multiplication table (TAKALINTAR) that makes it easier for students to understand multiplication materials from 1-10. The Smart Multiplication Table (TAKALINTAR) is a learning tool in the form of a rectangular table made of used cardboard or wooden boards (Harina et al., 2019). Therefore, the researcher decided to conduct this research with the title "The Use of TAKALINTAR Learning Media in Improving Mathematics Calculation Skills in Multiplication Material for Grade III Students at SDN Kartini II Kota Cirebon". Additionally, the researcher aims to determine the effectiveness of using the TAKALINTAR

learning media in improving multiplication skills, especially for third-grade students at SDN Kartini II Kota Cirebon, and to understand students' responses to the TAKALINTAR learning media.

METHODS

In this study, a quantitative approach was used. The type of research used was a pre-experimental quantitative study using a one group pretest-posttest design. The research was conducted on all third-grade students at SDN Kartini II, totaling 34 students. A saturated sampling technique can be used to select the research sample. According to (Ridwan & Hasanah, 2020), saturated sampling is a technique that determines the sample when all members of the population are used as samples. The researcher used interviews, tests, and documentation to collect data. Students in grade III at SDN KARTINI II were given a test to evaluate their multiplication skills. After the pretest and posttest questions were given, analysis activities were conducted for data that were not normally distributed against hypotheses using normality tests, homogeneity tests, and non-parametric t-tests (Wilcoxon Test) conducted using SPSS 22.

The research instrument consists of 5 multiplication questions, consisting of 3 regular multiplication questions with two to three digits, and 2 multiplication word problems. The researcher used inferential data in the analysis. Analysis with inferential techniques is a method of drawing conclusions based on a population that is based on existing samples. Analysis with inferential techniques is used to conduct tests for several stages.

In the first stage, students were given an initial test to measure their ability in solving multiplication problems before they received learning using media in classroom activities. The results based on both tests, the pretest and posttest, were used to identify the effectiveness of the Smart Multiplication Table (TAKALINTAR) media in learning, which would then be analyzed using the Normality

Test and the Non-Parametric t-test, specifically the Wilcoxon Test.

In the second stage, the Normality Test and Homogeneity Test will be conducted to meet the requirements for the next test. After conducting several tests, the Non-Parametric t-test, specifically the Wilcoxon Test, will be conducted. In the third stage, a non-parametric t-test will be conducted to determine the improvement in students' mathematical multiplication skills before the use of media and after the implementation of the TAKALINTAR media in learning.

Before conducting the arithmetic skills test, students who have studied multiplication are given a test. From this test, the quality of each test item can be evaluated using validity and reliability tests. The results of the validity test for each question using Pearson's product-moment correlation using SPSS 22 software are presented in Table 1.

Table 1. Kriteria Validasi

Number Test	Validity Index	Level of Validity
1	0.565	Medium
2	0.668	High
3	0.544	Medium
4	0.655	High
5	0.655	High

According to the validity test results in Table 1, all five questions meet the validity standard. Furthermore, the reliability test results using Cronbach's Alpha with SPSS 22 software can be seen in Table 2.

Table 2. Reliability Statistics

Cronbach's Alpha	N of Items
.597	5

Based on Table 2, the Cronbach's Alpha value is 0.597, which meets the criteria for reliable or consistent testing. From the validity and reliability tests, the 5 test questions can be used to measure the multiplication skills of 3rd-grade students.

RESULTS AND DISCUSSION

Results

This research was conducted at SDN Kartini II, Kejaksan District, Cirebon City, during the School Field Introduction II (PLP II) period from September 5 to November 4, 2024. Documentation of the TAKALINTAR implementation activities can be seen in Figure 1.



Figure 1. Implementation of TAKALINTAR learning media

After the research process was conducted in class III of SDN Kartini II, Cirebon City, the students' response to the implementation using the TAKALINTAR learning media showed that they felt very happy, enthusiastic, and interested during the mathematics learning process. The students liked the presence of TAKALINTAR as a learning media because they could learn and play at the same time, and the media had various colors and presented numbers more concisely and clearly, allowing them to learn mathematics better. In addition, the students were enthusiastic about practicing using the TAKALINTAR learning media and also said that the practice was enjoyable because it had attractive colors, making it easier to place the numbers. The results of the posttest answers

that have been conducted can be seen in Figure 2.

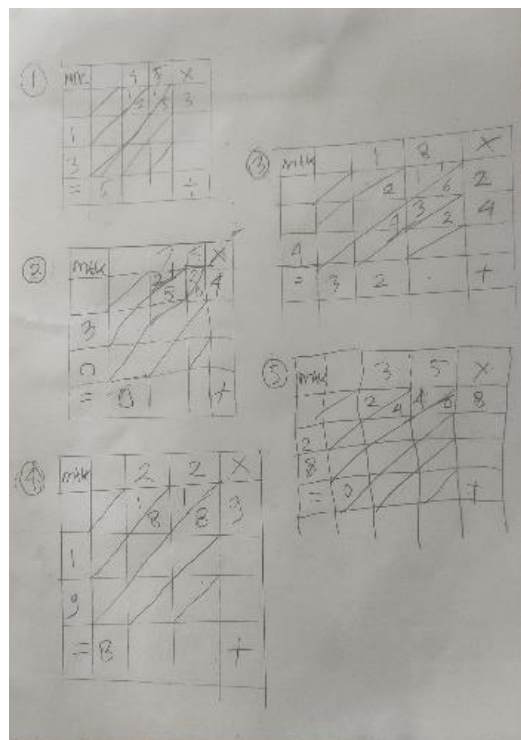


Figure 2. Posttest Results

Based on the results of the posttest answers shown in Figure 2, students were able to answer questions correctly using TAKALINTAR. However, some students made mistakes in placing the units and tens when multiplying. Additionally, some students were unsure, and to confirm their answers, they tried to multiply in the usual way on a blank page of the test.

After the researcher obtained the results of the pretest and posttest scores, which would determine the extent of improvement in students' mathematical multiplication skills, the first step was to conduct a quantitative descriptive test to determine the effectiveness of using the TAKALINTAR learning media. The calculation results can be seen in Table 3.

Table 3. Descriptive Results of Pretest and Posttest

Statistics		Pretest	Posttets
N	Valid	34	34
	Missing	0	0
Mean		46.47	87.65
Median		50.00	100.00
Std. Deviation		29.427	14.783
Minimum		0	60
Maximum		100	100

Based on Table 3 above, we can see that the minimum value for the pretest is 0 and for the posttest is 60. The maximum value for the pretest is 100 and for the posttest is 100. The average value for the pretest session is 46.47 and for the posttest session is 87.65. It can be concluded that the average pretest and posttest scores show a significant improvement in multiplication skills in mathematics, especially in the multiplication

material for third-grade students at SDN Kartini II, Cirebon City.

The next step is to calculate the N-gain based on the data from the pretest and posttest sessions that have been obtained, to determine the effectiveness of using the TAKALINTAR learning media. The results of the N-gain calculation can be done using SPSS and are presented in Table 4.

Tabel 4. N-gain

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	31	.33	1.00	.7812	.23093
Ngain_Persen	31	33.33	100.00	78.1183	23.09298
Valid N (listwise)	31				

Based on Table 4, the average N-gain for the pretest and posttest is 0.7812. It can be concluded that there is effectiveness in using the TAKALINTAR learning media, which falls into the high category because $g > 0.7$. Furthermore, the percentage of N-gain, which is the average or mean value obtained, is 78.1183. Therefore, it can be concluded that the use of the TAKALINTAR learning media is effective.

determine whether the Descriptive Test data is normally distributed. To determine whether the data is normal or not, if $Sig. > 0.05$, the data is normally distributed, and if $Sig. < 0.05$, the data is not normally distributed. The researcher conducted the Normality Test using the Shapiro-Wilk type because the sample size is < 50 . The results of the Normality Test that have been conducted using SPSS can be presented in Table 5.

The next step is to conduct a normality test. The Normality Test is conducted to

Table 5. Uji Normalitas nilai pretest dan posttest

Tests of Normality						
	Kolmogorov-Smirnova			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Pretest	.177	34	.008	.927	34	.026
Posttets	.328	34	.000	.746	34	.000

a. Lilliefors Significance Correction

Based on Table 5, it is found that the significance value (Sig.) in the Shapiro-Wilk test for the pretest data is Sig. = 0.026 (Sig. < 0.05), indicating that the data is not normally distributed. For the posttest data, Sig. = 0.000 (Sig. < 0.05), also indicating that the data is not normally distributed. Because the Sig. values for both the pretest and posttest data are < 0.05, it can be concluded that the data in this study is not normally distributed.

After the Normality Test, both data sets were found to be non-normal. Next, the Homogeneity Test was conducted to determine whether the samples in this study came from the same population variation. The results of the Homogeneity Test conducted using SPSS can be presented in Table 6.

Tabel 6. Uji Homogenitas nilai pretest dan posttest

Test of Homogeneity of Variances			
Pretest			
Levene			
Statistic	df1	df2	Sig.
1.531	2	31	.232

Based on Table 6 above, the data variation for the pretest and posttest with a Sig. value of 0.232 (Sig > 0.05), the variances for the pretest and posttest are assumed to be homogeneous. Thus, it can be concluded that there is a significant effect of using TAKALINTAR on the mathematics counting skills in multiplication for grade III students at SDN Kartini II Kota Cirebon.

After conducting the prerequisite analyses such as the Normality Test and Homogeneity Test, the next step is to perform the non-parametric test, which is the Wilcoxon Signed-Rank Test, due to the data not being normally distributed. The Wilcoxon test is conducted to determine the effectiveness of using TAKALINTAR as a learning media to improve mathematical counting skills in multiplication. Additionally, the Wilcoxon test will show significant differences between the pretest and posttest

scores when using TAKALINTAR as a learning media. The results of the Wilcoxon test calculation using SPSS can be presented in Table 7:

Tabel 7. Uji Wilcoxon nilai pretest dan posttest

Test Statistics ^a	
	Posttest - Pretest
Z	-4.909b
Asymp. Sig. (2-tailed)	.000

a. Wilcoxon Signed Ranks Test

b. Based on negative ranks.

Based on Table 7 above, the Wilcoxon test result for the pretest and posttest data yielded Asymp. Sig. (2-tailed) = 0.000, thus accepting H_a and rejecting H_o . This indicates that there is a significant difference between the pretest and posttest scores in using the TAKALINTAR learning media to improve the mathematical multiplication skills of third-grade students.

DISCUSSION

Based on the inferential analysis and calculations using SPSS 22, it was found that the data on students' mathematical calculation skills in multiplication consisted of pretest and posttest scores conducted by the students. This study showed a significant improvement, with the average pretest score before using the TAKALINTAR learning media being 46.47, lower than the average posttest score after using the TAKALINTAR learning media of 87.65. This is in line with a study by (Saputra et al., 2019), which conducted research on the ladder snake media, revealing that 80% of students completed learning, meaning that the learning media used greatly influences and can improve learning outcomes. The Wilcoxon test result for the pretest and posttest data yielded a Asymp Sig. (2-tailed) value of 0.000, which can be interpreted as a significant increase in scores. Therefore, it can be concluded that the use of the

TAKALINTAR learning media can be more effective in improving students' ability to operate multiplication numbers in mathematics in the third grade of SDN Kartini II Kota Cirebon. This is supported by (Lismayana et al., 2023), who found that using the TAKALINTAR learning media during the learning process is very beneficial and can improve student learning outcomes. Initially, student learning outcomes were low, but they can be significantly improved by using learning media. Furthermore, the N-gain results indicate that the effectiveness of using the TAKALINTAR learning media is in the high category at 0.7812. Therefore, it is concluded that the use of TAKALINTAR will have a significant impact on students' ability to calculate mathematics, especially in multiplication in the third grade of SDN Kartini II Kota Cirebon.

The inferential analysis results indicate that the use of the TAKALINTAR learning media in the third grade of SDN Kartini II Kota Cirebon has a positive impact on students, making them more effective and enthusiastic in the learning process. Furthermore, the results show that using the TAKALINTAR learning media to improve students' multiplication skills in mathematics in the third grade at SDN Kartini II Kota Cirebon has been proven to be more effective than not using any learning media at all. In line with the research conducted by (Wapa et al., 2023), this study found that the Smart Multiplication Table (TAKALINTAR) learning tool is effective in improving calculation skills in multiplication, with a moderate category. The existence of the TAKALINTAR learning media makes it easier for students to operate multiplication quickly without confusion about the numbers involved, thus stimulating students to study diligently. This is in line with the statement by (Sari & Rusnilawati, 2022) that the TAKALINTAR media makes it easier to calculate basic multiplication, presenting numbers in an interesting, clear, and concise manner, encouraging students to learn and providing motivation.

As an important part of the education system, learning media has great potential to enhance learning effectiveness in the classroom. In line with the research by (W. Lestari & Firdaus, 2023), which states that learning media can have a positive effect on the learning material received by students during the learning process. According to (Akmalia et al., 2021), learning media is said to be a conveyer of messages or a mediator of messages between teachers and students, thus stimulating students' minds to increase their interest in the learning process. Although the focus is different, researchers see that the use of the TAKALINTAR learning media can also increase students' interest in learning mathematics. The research by (Sumilat et al., 2022) highlights the influence of online media on mathematics learning in the calculation operations subject in elementary schools. Although not directly related to the TAKALINTAR media, this finding supports the importance of using interactive and engaging learning media in the context of mathematics learning. (Darmayanti, 2023) in her research related to exploring the effects of using visualization-oriented learning media can improve students' understanding of concepts and critical thinking skills in flat shape materials. Researchers see that TAKALINTAR, with its visual features, can be an effective tool in strengthening students' understanding of multiplication. In addition, TAKALINTAR can improve students' learning independence. As stated by (Yaniawati et al., 2020) in their research on e-learning media, it is revealed that this media improves students' independence and self-confidence.

The learning media developed by the researchers is the Smart Multiplication Table (TAKALINTAR). The TAKALINTAR media is one of the media that helps students improve their ability and understanding of multiplication operations. The appearance or form of the TAKALINTAR learning media is designed to be as simple as possible so that it is easy to understand and does not use attractive colors to avoid boredom. This is in

line with the opinion according to (Kusuma & Wilujeng, 2022), TAKALINTAR or Smart Multiplication Table is a media that helps simplify students in multiplication operations, it can be interpreted that TAKALINTAR is a media/tool that facilitates multiplication. The use of the Smart Multiplication Table (TAKALINTAR) learning media is very good in learning. According to (Sitepu, 2022), TAKALINTAR is one of the media in mathematics learning presented in the form of a table and made of cardboard or cork that teaches students multiplication and addition.

The purpose of learning media, especially TAKALINTAR, is to help students master and understand the concept of multiplication systematically. By using TAKALINTAR, students can more easily visualize mathematical patterns and improve their speed and accuracy in multiplying numbers. This is in line with the opinion of (S. Lestari, 2021) that the purpose of TAKALINTAR is not only to facilitate learners in carrying out arithmetic operations, especially multiplication. This media can also improve understanding of mathematical concepts as a whole. According to (Firdaus, 2018), TAKALINTAR media is a media that is very much needed to make multiplication simple, therefore such a calculation tool is made. The advantages of media, especially Takalintar, are: (1) helping students in calculating, especially multiplication ranging from 2 to 4 digits, (2) providing varied colors to refresh and trigger the interest of learners, (3) presenting clear and concise numbers, (4) improving students' skills in arithmetic (Hasanah & Sari, 2022).

It is well known that this learning media is very supportive of learning. However, in its implementation, there are obstacles that arise. As experienced by the researcher when implementing the TAKALINTAR media, students fought over the media. This will result in a less conducive class. A less conducive class will lead to a loss of student focus, so students are not concentrated during learning (Rahayu et al., 2024). The classroom environment will trigger

student learning outcomes. Therefore, this situation is a challenge for a teacher in classroom management. According to (Affandi et al., 2020), classroom management challenges are classified into internal and external challenges. To overcome both internal and external classroom management challenges, teachers should arrange the physical classroom environment so that a comfortable atmosphere is created in the classroom. In line with the research by (Setyaningsih & Suchyadi, 2021), it is stated that one of the things that needs to be done in classroom management is to condition students to be ready to learn in the classroom. In terms of classroom conditioning, teachers can create study groups for students so that the learning media applied can be applied in groups. Supported by the research by (F. Ya. & T.H., 2020), which states that the small group method is most effective when used in practice. In accordance with this, in the implementation of TAKALINTAR, it is advisable to do so by creating small groups in the classroom.

During the process of implementing the TAKALINTAR learning media to students, they become more active, enthusiastic, and interested, thus able to foster learning motivation in students compared to not using learning media during the learning process. In line with the statement by (Marganis et al., 2023) that the TAKALINTAR media is a great learning tool for teaching multiplication mathematics. It makes students excited to learn, helps them understand the concept of multiplication better, and improves their learning outcomes.

CONCLUSION

The implementation of TAKALINTAR in mathematics learning in the 3rd grade of Kartini II Public Elementary School in Cirebon City has received positive responses from students. Throughout the learning process, they expressed happiness, enthusiasm, and interest. The use of this media is preferred because it allows children

to learn while playing and has various colors, making numbers come alive and easy to understand. In addition, there has been a significant improvement in the ability to perform mathematical calculations, especially in multiplication. asserts that the use of TAKALINTAR media is effective in improving the mathematical calculation skills of third-grade students.

The aim of this study is to determine the effectiveness of using the TAKALINTAR learning media in improving the multiplication skills of third-grade elementary school students and to understand students' responses to the TAKALINTAR learning media. For future research, for example, the process of understanding mathematical multiplication could be explored by comparing the effectiveness of teaching with other multiplication methods, such as direct instruction, manipulative mathematics, or game-based learning, using the TAKALINTAR learning media. In the study of multiplication in mathematics, consider various approaches.

This study has made a significant contribution in determining the effectiveness of the TAKALINTAR learning media in improving students' multiplication skills. Empirical evidence has been presented in this study that the use of the TAKALINTAR learning media can be an effective strategy to improve students' understanding and skills in mathematics, especially in multiplication problems. This research has also validated the effectiveness of the TAKALINTAR learning media in improving the mathematical calculation skills of third-grade students in multiplication.

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