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The Effectiveness of Smart Multiplication Table Media (Talintar) in Improving Understanding of Multiplication Concepts

Ade Mulyanti[1], Edhy Rustan[2], Sumardin Raupu[3]
[123] Universitas Islam Negeri Palopo; Indonesia
Correspondence Email; sumardin_aldhy@uinpalopo.ac.id

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Abstract

Understanding the concept of multiplication is a basic competency that must be mastered by elementary school students as a foundation in learning more complex mathematical concepts. However, the low understanding of the concept of multiplication is still a problem in the learning process so that learning media are needed that can help students understand the concept more concretely. This study aims to analyze the effectiveness of the use of Smart Multiplication Table Media (Talintar) in improving the understanding of the concept of multiplication of grade III students of SD Negeri 64 Tobulung. This study uses a quantitative approach with a quasi-experimental design of the pretest-posttest control group design. The research sample was 45 students selected using cluster random sampling techniques. Data were collected through observation and tests, then analyzed using descriptive and inferential statistics. The results of the study showed that the implementation of learning using Talintar media was in the very good category. The average pretest score of the experimental class increased from 35.10 (very poor category) to 87.50 (good category) in the posttest, while the control class only increased from 30.97 (very poor category) to 62.28 (poor category). The results of the hypothesis test showed a Sig. value. (2-tailed) = 0.000 (<0.05), which indicates a significant difference between the experimental class and the control class. Thus, the Talintar media has been proven effective in improving the understanding of multiplication concepts of grade III students at SD Negeri 64 Tobulung and can be an alternative mathematics learning media in elementary schools.

Keywords Effectiveness, Smart Multiplication Table Media (Talintar), Understanding of Multiplication Concepts.

INTRODUCTION

Mathematics is a subject that plays a crucial role in developing logical, analytical, critical, and systematic thinking skills in elementary school students. One of the fundamental competencies that students must master in mathematics is understanding the concept of multiplication. Understanding the concept of multiplication is not only related to the ability to memorize multiplication results but also includes the ability to understand the meaning of multiplication as repeated addition, grouping numbers, and the relationships between mathematical concepts. Mastery of this concept forms the foundation for learning more complex mathematical materials, such as division, fractions, and other arithmetic operations (Novita dkk., 2022). Therefore, multiplication learning needs to be designed meaningfully so that students not only become skilled at performing calculations but also able to understand and apply multiplication concepts in various problem-solving contexts.

To help students optimally understand the concept of multiplication, the learning process needs to be supported by the use of learning media that are appropriate to the characteristics of the material and students' learning needs. Learning media acts as a tool that helps visualize abstract mathematical concepts, making them easier for students to understand (Melinda dkk., 2024). The use of interesting and interactive media can also increase student engagement in the learning process, foster interest in learning, and create a more meaningful learning experience (Muhimmah dkk., 2025). Therefore, selecting the right learning media is an important factor in supporting the improvement of understanding of mathematical concepts in elementary schools.

Although learning media plays a crucial role in helping students understand mathematical concepts, its implementation in elementary schools still faces various challenges. Initial observations conducted at Tobulung 64 Public Elementary School on April 30, 2025, showed that the use of learning media in mathematics learning was still limited to blackboards and textbooks. This situation resulted in students memorizing multiplication results rather than understanding the basic concepts. The observations also revealed that 10 third-grade students still had difficulty explaining multiplication concepts, solving two-digit multiplication problems, and connecting contextual problems with the correct multiplication operations. These findings indicate that the ongoing learning process has not been fully able to build an optimal understanding of multiplication concepts, thus requiring more concrete and interactive learning media.

Various studies have shown that the use of visual and interactive learning media can

improve the quality of mathematics learning in elementary schools, particularly in multiplication. The Smart Digital Multiplication Table media significantly influences elementary school students' understanding of multiplication concepts (Marganis dkk., 2024). Similarly, (Nahara dkk., 2024) reported that the use of Jendela Paper and Talintar media can improve students' mathematics learning outcomes in multiplication. Furthermore, (Aulia Wulan, 2024) developed digital-based Takalintar media, which was declared feasible, practical, and quite effective in improving students' multiplication memorization abilities. These findings indicate that Talintar media has potential as a learning medium that can support mathematics learning in elementary schools.

Although previous studies have demonstrated positive results regarding the use of Talintar and similar media in mathematics learning, several aspects remain understudied. Previous research has focused more on the development of digital-based media, improving learning outcomes, or improving multiplication memorization skills. Meanwhile, research specifically analyzing the effectiveness of Talintar as a concrete learning medium for understanding multiplication concepts through a quasi-experimental design in elementary school students is still limited. Based on this gap, this study aims to analyze the effectiveness of Talintar in improving the understanding of multiplication concepts in third-grade students at SD Negeri 64 Tobulung.

Therefore, this research is expected to contribute to the development of mathematics learning in elementary schools through the use of Talintar. Theoretically, this research is expected to enrich the study of the effectiveness of learning media in improving understanding of mathematical concepts. Practically, the results of this study are expected to serve as a reference for teachers in selecting and utilizing innovative learning media, thereby creating more meaningful, interactive, and student-centered mathematics learning.

METHOD

This study used a quantitative approach with a quasi-experimental approach and a pre-test–post-test control group design. The study was conducted at SD Negeri 64 Tobulung, Palopo City. This design was chosen to test the effectiveness of Talintar media in improving third-grade students' understanding of multiplication concepts by comparing student learning outcomes before and after the implementation of the learning media.

The study population was all 45 third-grade students at SD Negeri 64 Tobulung, divided into two classes. The sample was determined using cluster random sampling. Class IIIA, consisting of 22

students, was designated as the experimental class, while class IIIB, consisting of 23 students, was designated as the control class.

Research Instrumens

This study used two instruments: an observation sheet and a test. The observation sheet was used to obtain data on the implementation of learning using Talintar media. The test, consisting of five essay questions administered via pre- and post-tests, was used to measure students' understanding of multiplication concepts before and after the implementation of Talintar media.

Prosedur Penelitian

The study began with a pre-test administered to the experimental and control classes to determine students' initial abilities. Next, the experimental class received instruction using Talintar media, while the control class underwent conventional instruction without the use of Talintar media. After the entire learning process was completed, both classes were given a post-test to measure students' understanding of multiplication concepts. The research stages are presented in Figure 1.

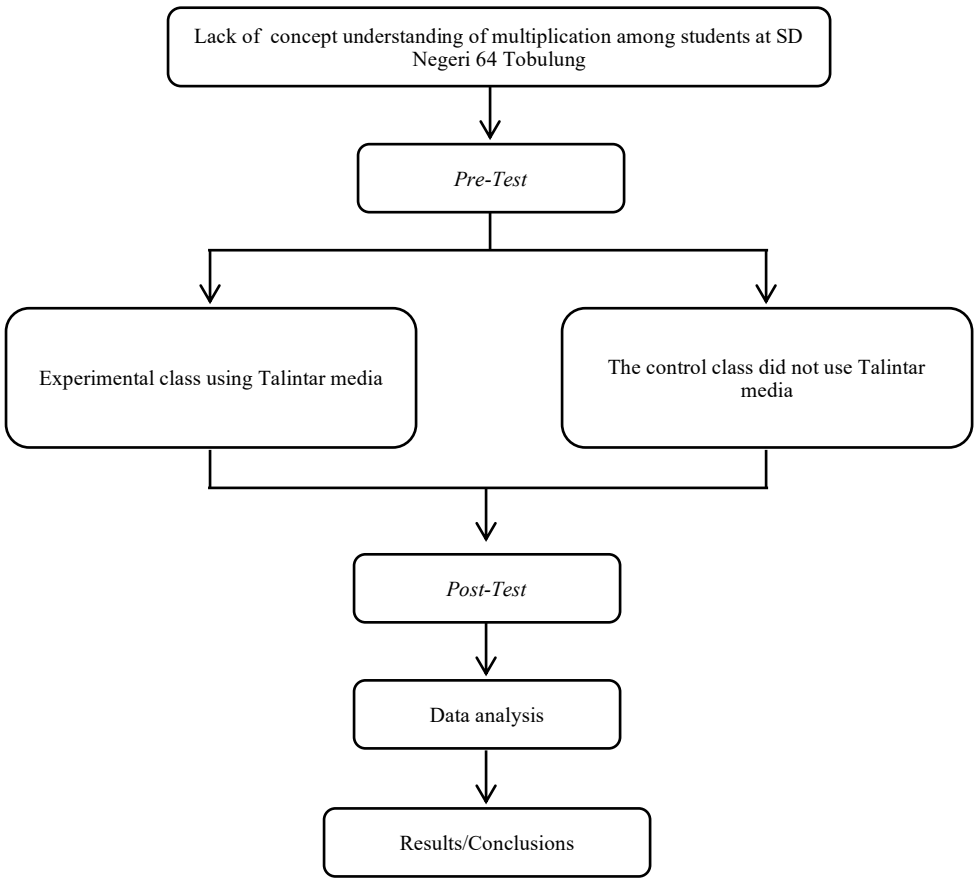

Figure 1. Research Stages Chart

Data Analysis

The research data were analyzed using descriptive and inferential statistics. Descriptive statistics were used to describe the implementation of learning and the results of pre-test and post-test students' understanding of multiplication concepts. Furthermore, inferential statistics were used to test the effectiveness of Talintar media. Before hypothesis testing was conducted, the data were first tested using normality and homogeneity tests to ensure that the data met the assumptions of parametric analysis. After meeting both assumptions, hypothesis testing was conducted using the Independent Sample t-Test to determine differences in understanding of multiplication concepts between the experimental and control classes.

FINDINGS AND DISCUSSION

Findings

This section presents research findings regarding the effectiveness of Talintar media in improving the understanding of multiplication concepts of third-grade students at SD Negeri 64 Tobulung. Research findings were obtained through observation sheets of learning implementation and multiplication concept understanding tests given in the form of pre-tests and post-tests. The presentation of research results includes learning implementation, descriptive statistics, assumption tests consisting of normality tests and homogeneity tests, as well as hypothesis tests to determine the effectiveness of using Talintar media.

Learning Activities Implementation

The implementation of learning using Talintar media was observed during two meetings through observation sheets of teacher and student activities. Observations were conducted to determine the implementation of each stage of learning using Talintar media in accordance with the learning plan that had been prepared and the level of student involvement during the learning process. The results of observations of teacher and student activities are presented in table 1 and table 2.

Table 1. Summary of Teacher Activity Observation Results

Meeting	Percentage (%)	Category
I	91,07 %	Very good
II	98,21 %	Very good
Mean	94,64 %	Very good

Source: Research Data

Based on Table 1, observation results indicate that teacher activity during learning using Talintar media was in the very good category. The percentage of learning implementation in the first meeting reached 91.07%, then increased to 98.21% in the second meeting. Overall, the average percentage of teacher activity was 94.64%, indicating that all learning stages were implemented according to the prepared lesson plan.

Table 2. Summary of Student Activity Observation Results

Meeting	Percentage (%)	Category
I	73,70 %	Good
II	93,18 %	Very good
Mean	83,44 %	Very good

Source: Research Data

Based on Table 2, student activity during learning using Talintar media increased at each meeting. The percentage of student activity in the first meeting was 73.70%, categorized as good, then increased to 93.18% in the second meeting, categorized as very good. The average percentage of student activity reached 83.44%, thus included in the very good category. These results indicate that the use of Talintar media can encourage active student involvement during the learning process, both in paying attention to teacher explanations, using the media, and completing the given exercises.

Overall, observations of teacher and student activities indicate that learning using Talintar media was very successful. This optimal learning implementation serves as the basis for analyzing students' understanding of multiplication concepts through pre-test and post-test results in the next stage.

Results of Student's Understanding of Multiplication Concepts Using Talintar Media

To determine changes in students' understanding of multiplication concepts after the learning process, a descriptive statistical analysis was conducted on the pre-test and post-test results in the experimental and control classes. This analysis included the number of samples, minimum value, maximum value, average value, and standard deviation, as presented in Table 3.

Table 3. Descriptive Statistics of Pre-test and Post-test

Group	N	Minimum	Maximum	Average	Standard Deviation
Pre-test Experiment	22	6,6	73,3	35,1	20,82
Post-test Experiment	22	66,6	100	87,5	10,15
Pre-test control	23	6,6	66,6	30,97	19,14
Post-test control	23	20	100	62,28	22,44

Source: Research data processed using IBM SPSS Statistics 26

Based on Table 3, the average pre-test score in the experimental class was 35.1, then increased to 87.50 in the post-test. This increase indicates that after learning using Talintar media, students' understanding of multiplication concepts significantly improved. Furthermore, the standard deviation decreased from 20.82 to 10.15, indicating that student learning outcomes after the treatment were more evenly distributed compared to before the learning process.

Meanwhile, in the control class, the average pre-test score increased from 30.97 to 62.28 in the post-test. Although there was an increase in learning outcomes, the increase was not as significant as in the experimental class. The standard deviation in the control class also increased from 19.14 to 22.44, indicating that the variation in student learning outcomes after the learning process was still relatively high.

In general, the descriptive statistics show that both classes experienced improved learning outcomes after the learning process. However, the average increase in scores in the experimental class was higher than in the control class. These findings provide a preliminary indication that the use of Talintar media has the potential to positively impact students' understanding of multiplication concepts. To determine whether this difference is statistically significant, prerequisite tests and hypothesis tests were conducted.

Normality Test

Before conducting the hypothesis test, a normality test was first performed to determine whether the research data were normally distributed. The normality test was performed using the Kolmogorov-Smirnov test. The results of the normality test are presented in Table 4.

Table 4. Normality Test Results

Group	Sig. Kolmogorov-Smirnov	Category
Pre-test Experiment	0,200	Normal
Post-test Experiment	0,102	Normal
Pre-test control	0,084	Normal
Post-test control	0,098	Normal

Source: Research data processed using IBM SPSS Statistics 26

Based on Table 4, the results of the normality test using the Kolmogorov-Smirnov test indicate that the significance values for the pre-test and post-test in both the experimental and control classes were greater than 0.05. Thus, all research data were normally distributed, fulfilling one of the prerequisites for hypothesis testing using the Independent Sample t-test.

Homogeneity Test

After the data was declared normally distributed, a homogeneity test was conducted to determine the similarity of variance between the experimental and control classes. The results of the homogeneity test are presented in Table 5.

Table 5. Results of Homogeneity Test

		Levene Statistic	*df1*	*df2*	*Sig.*
Understanding the Concept of Multiplication	*Based on Mean*	2.890	1	43	0,096
	Based on Median	1.963	1	43	0,168
	Based on Median and with adjusted df	1.963	1	28,672	0,172
	Based in trimmed mean	2,935	1	43	0,094

Source: Research data processed using IBM SPSS Statistics 26

Based on Table 5, the significance value is 0.096, which is greater than 0.05. This indicates that the data variance in the experimental and control classes is homogeneous. Thus, the research data meets the requirements for hypothesis testing using the Independent Sample t-test.

Hypothesis Testing

Hypothesis testing was conducted to determine the effectiveness of using Talintar media on the understanding of multiplication concepts among third-grade students at SD Negeri 64 Tobulung. Hypothesis testing was conducted using an Independent Sample t-test. The results of the hypothesis testing are presented in Table 6.

Table 6. Hypothesis Test Results

		Levene's test for equality of variances		*T-test for equallity of means*		
		F	**Sig.**	**T**	**df**	**Sig.(2-tailed)**
Understanding the Concept of Multiplication	*Equal variance assumed*	13,395	0,001	4,827	43	0,000
	Equal variances not assumed			4,900	30,936	0,000

Source: Primary Data obtained using IBM SPSS 26

Based on table 6, the significance value (Sig. 2-tailed) is 0.000, which is smaller than 0.05. Thus, H_0 is rejected and H_1 is accepted. These results indicate that there is a significant difference between the understanding of multiplication concepts of students who learn using Talintar media and students who learn using conventional learning. Thus, Talintar media is effective in improving

the understanding of multiplication concepts of third-grade students at SD Negeri 64 Tobulung.

Discussion

The results of the study indicate that the use of Talintar media is effective in improving the understanding of multiplication concepts among third-grade students at SD Negeri 64 Tobulung. This is demonstrated by the increased understanding of multiplication concepts in the experimental class after learning using Talintar media, and is supported by the results of the hypothesis test, which showed a significant difference compared to the control class. These findings indicate that the use of Talintar media has a positive impact on students' ability to understand multiplication concepts, so that learning is not only oriented towards memorizing multiplication results but also helps students better understand the meaning and relationships between multiplication concepts.

The effectiveness of Talintar media in improving understanding of multiplication concepts is influenced by the media's characteristics, which are able to present material visually, concretely, and systematically, making it easier for students to grasp multiplication concepts. Through this media, students not only memorize multiplication results but also understand the relationships between numbers and the multiplication process more meaningfully. This finding aligns with the opinion of (Yuniarti dkk., 2023) who stated that learning media plays a crucial role in helping teachers and students acquire new concepts, skills, and abilities. Furthermore, (Husna & Supriyadi, 2023) also stated that the use of effective learning media can create a more engaging and meaningful learning environment. Therefore, the use of Talintar media provides a more active learning experience, helping students better understand multiplication concepts.

In addition to improving understanding of multiplication concepts, the use of Talintar media also had a positive impact on the classroom learning process. During the lesson, students showed greater enthusiasm, participated more actively in learning activities, and were more confident in solving multiplication problems. Talintar media also helped teachers present material in a more structured and understandable manner because multiplication concepts were visualized through simple and systematic tables. Thus, the learning process became more interactive, meaningful, and student-centered, thus aligning with the learning principles of the Independent Curriculum, which emphasizes active student involvement in constructing their understanding.

The results of this study align with several previous studies showing that the use of learning media can improve students' understanding of multiplication concepts. Research by Marganis (2024) demonstrated that the Smart Digital Multiplication Table media positively influenced

elementary school students' understanding of multiplication concepts. Similarly, research by Diyarotun Nahara (2024) demonstrated that the use of Jendela Paper and Talintar media can improve mathematics learning outcomes in multiplication. Furthermore, (Aulia Wulan, 2024) also concluded that digital-based Takalintar media is effective in helping students improve their multiplication memorization skills. The similarity between these studies and this study lies in the use of learning media as a means to improve students' ability to understand multiplication material. The difference is that this study uses physical (non-digital) Takalintar media focused on improving the understanding of multiplication concepts in third-grade students, thus providing an alternative learning medium that is practical and easy to implement by elementary school teachers.

The findings of this study contribute to the development of mathematics learning in elementary schools, particularly in multiplication. Talintar media can be an alternative learning medium that is simple, easy to use, and economical to help teachers explain multiplication concepts to students. The use of this media also supports the creation of more active, meaningful, and student-centered learning, thereby helping to improve the quality of the mathematics learning process. Therefore, Talintar media can be recommended as an alternative learning medium for mathematics, particularly in multiplication in elementary schools, while still considering student characteristics, learning objectives, and school conditions.

CONCLUTION

This study demonstrates that the use of Talintar media is an effective learning alternative for improving the understanding of multiplication concepts among third-grade students at SD Negeri 64 Tobulung. Through its visual, concrete, and systematic presentation of material, Talintar media supports a more meaningful learning process, helping students better grasp multiplication concepts. These findings demonstrate that utilizing learning media appropriate to the characteristics of the material and students can support the achievement of mathematics learning objectives in elementary schools.

This study demonstrates that the use of simple and easy-to-implement learning media can be a solution for improving the quality of mathematics learning, particularly in multiplication. Therefore, Talintar media has the potential to be used as an alternative learning medium by elementary school teachers. Future research is expected to develop or test the application of this media to different mathematics materials and educational levels so that its benefits can be studied

more broadly.

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