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Jl. Yos Sudarso KM. 08 Rumbai Pekanbaru-Riau
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PRAKATA

Bismillah, Assalamu'alaikum Warohmatullohi Wabarokaatuh.

Puji syukur kami sampaikan kepada Allah Subhanahu wa Ta'ala atas rahmat dan karunia-Nya sehingga proses penerbitan "Lectura: Jurnal Pendidikan" Volume 15 Nomor 2 ini dapat berjalan dengan baik. Selanjutnya, terima kasih yang tak terhingga kami haturkan kepada para penulis, tim *editor*, serta *reviewers* yang terlibat dalam jurnal ini. Dalam edisi terbitan ini, terdapat 24 artikel hasil penelitian di bidang pendidikan. Oleh karena itu, penulis-penulis yang tergabung di dalam jurnal ini umumnya adalah dari kalangan dosen, guru, peneliti, praktisi pendidikan, dan mahasiswa bidang keguruan dan ilmu pendidikan.

Kami menyadari bahwa di dalam jurnal ini masih sangat mungkin terdapat kekurangan, kelemahan, ataupun keterbatasan. Oleh karena itu, saran dan masukan yang sifatnya membangun sangat diharapkan demi terwujudnya terbitan yang lebih baik di masa yang akan datang.

Hormat kami,

Pekanbaru, Agustus 2024

M. Fadhly Farhy Abbas, S.Pd., M.Pd
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SINTA 3

Development of Musi Board Teaching Media on Math Arithmetic Operation for Grade II Elementary School Student

Dimas Wahyu Pratama
Universitas Muhammadiyah Prof. Dr. Hamka

Ima Mulyawati
Universitas Muhammadiyah Prof. Dr. Hamka

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Keywords: Math, arithmetic operations, Musi board media

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This research is based on the problems that exist in math subjects, especially in multiplication, adding, and subtracting. One of the fundamental problems experienced by students is a lack of understanding of basic concepts due to the lack of understanding of students reasoning and only paying attention to what is on the blackboard and the lack of learning media used during learning. In order for their understanding and numeracy skills to increase, learning resources for the Musi Board are needed. This study aims; (1) to test the feasibility of Musi Board Media on math arithmetic operations; (2) to see students response when learning using Musi Board Media on math arithmetic operations; (3) the effectiveness of Musi Board Media on math arithmetic operations. Using the ADDIE methodology (analysis, design, development, implementation, and evaluation), this study used the Research and Development approach. The study involved 26 students from grade II of SDN dukuh 08. This media had shown the validity of the media and materials with 94% and 95%, respectively, with a very feasible category. Students' responses also reached 96%, respectively, with

a very interesting category. The results show that this Musi Board Media is feasible to use to help students learning. Therefore, the solution to overcome the problems of students to understand the basic concepts of mathematics in counting operations is to use the media during the lesson. With an N-gain value of 59.26%, the effectiveness of utilizing Musi Board medium for math arithmetic operations falls into the Moderately Effective group.

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Development of Musi Board Teaching Media on Math Arithmetic Operation for Grade II Elementary School Student

Dimas Wahyu Pratama
Universitas Muhammadiyah Prof. Dr. Hamka
E-mail: dimaswahyupratama19@gmail.com

Ima Mulyawati
Universitas Muhammadiyah Prof. Dr. Hamka
E-mail: ima.mulyawati@uhamka.ac.id

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Abstract
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Keywords: Math, arithmetic operations, Musi board media

INTRODUCTION

Education plays an important role, especially in determining the future. According to Fauziah & Ninawati (2022), education is the process that humans experience to learn their own environment. In order to prepare students to follow the development of an increasingly advanced era, education is used to equip students with knowledge related to creativity, intelligence, and morals. Education is viewed as a tool for adult development in the present as well as a means of preparing for the future. Everyone can influence the improvements through education if they follow the steps to involve in achieving quality education, which is undoubtedly directly tied to the learning process both inside and outside the classroom. Education itself can be obtained formally and informally. Formal education is obtained when someone starts entering school. Here is where students begin learning the fundamentals of character development and discipline. During their education, students will learn math, language, science, social studies, and other subjects. Furthermore, education instills ideals in students that will strengthen their relationships with the Almighty, other people, the environment, and their nation. Students' emotional and cognitive development is further aided by education. In order to produce a generation of people who are responsible, educated, skillful, independent, healthy, and strong, education is meant to form pupils. For this reason, all students have the right to a sufficient education, enabling them to develop into the next generation of highly skilled individuals.

The purpose of education is to direct all forces as members of society toward the highest degree of safety and satisfaction since it acts as a guide for students' development. Education in school itself has a variety of scientific fields that are taught to students who attend the school there, for example the field of mathematics. One of the courses that can forecast student's ability level that is, whether the student falls into the low, medium, or high ability category at school is mathematics. Additionally, pupils view mathematics as one of more challenging disciplines. It is a typical indication that most students detest mathematics since they find it hard to grasp and hence find it less interesting. This aversion to arithmetic might have an impact on learning activities and the comprehension level of the students.

According to Cahyaningsih & Nahdi (2020), Mathematics is part of human activities in organizing a learning environment to assist students in learning. The purpose of this math is to get better at understanding and thinking better (Setyaningrum et al., 2023). One of the crucial topics that Indonesian schools have to teach at all grade levels is mathematics. Due to the fact that math is useful in many areas of life and is a universal language. Numerous academic fields depend on mathematics. In primary education, mathematics is one of the disciplines taught. Talking about math is definitely talking about counting, which is also known as arithmetic. Almost all math concepts always involve counting. The learning made by the teacher must be adapted to the development of students. When learning math in elementary school, rather than just listening to the teacher explain what they are learning, students should make their own discoveries. This can be achieved by using appropriate mathematical methods or approaches. Problem solving, realistic, constructivist and contextual approaches are some of the approaches used to teach mathematics.

Counting operations according to Rukiah et al. (2018) states that adding, subtracting, multiplying, and dividing are four basic operations that make up arithmetic operations. The word "operation" comes from the word "count", which means counting (adding, subtracting, multiplying, and dividing). Counting means doing mathematical operations such as adding, subtracting, and so on. Addition, subtraction, multiplication

and division are the four basic arithmetic operations. It is very important to master basic arithmetic operations as this will be the foundation for those who want to learn math. Therefore, the concept of counting must be thoroughly understood by those who will learn math. In order to build numeracy skills which are essential in daily life and serve as the cornerstone for the development of mathematical aptitude and preparedness for basic education arithmetic operations are required. Students' proficiency with mathematical operations is an exercise that enhances their psychomotor, emotional, and cognitive capacities. When learning mathematics, one of the cognitive skills that pupils need to develop is counting. In addition, in order for their understanding and ability to increase, learning media is needed. Learning media is one of the most important elements of learning resources (Khairunisa et al., 2019).

Because this media is an important source for students to gain knowledge, educators must be creative and innovative when using it. When learning resources are not used to their full potential, students may become easily bored and lose interest in participating in classes. This can impair the learning process. Learning media serve the dual purposes of enhancing and supporting the teaching and learning process and providing clarification on the concepts being taught to ensure that learning objectives are met in an efficient, superior, and flawless manner. In actuality, though, media use is still frequently disregarded for a variety of reasons, such as a lack of budgetary funding for creating educational media, a lack of time to create learning materials, and difficulties locating appropriate media that correspond with the subject matter required for instruction. If every educator has the knowledge and abilities to create instructional media, this won't occur. Numerous learning resources are available that can be chosen, created, and employed based on goals, resources, schedule, and conditions. These resources come in a variety of forms and have different qualities. Therefore, the learning media that will be used to make learning interesting is the Musi Board Media.

Musi Board Media or multifunctional board is a two dimensional learning tool that has a square shape made of boards for multiplication, addition, division, and subtraction (Rahmayanti et al., 2021). One of the resources that are very helpful in teaching mathematics is the Musi Board, which can help teachers provide explanations of the material. Marton et al. (2023) the purpose of the Musi Board Media is to make arithmetic ideas easier for students to understand by giving them a clear and interesting picture of the subject being discussed. One of the measures used to assess how well a school is performing is how well its students are achieving their goals. Benefits of Musi Board Media according to Nurhasanah et al. (2022), the use of Musi Board Media in learning is (1) Increase student understanding; (2) Increase student involvement; (3) increase student interest; (4) facilitate the teaching and learning process. This Musi Board Media can increase the creativity of educators in the process of teaching mathematics related to counting operations. (1) Musi Board's benefits is that it can boost creativity when creating media. Furthermore, students become more engaged and derive significant learning from this media; (2) expand the variety, inventiveness, and creativity of math instruction; (3) facilitate the delivery of material by teachers and students and make it more concrete; (4) draw in more students' attention to math lessons and be able to be utilized repeatedly in the classroom; (5) improve students' counting abilities, train their fine motor skills, and train their concentration. However, the following are the drawbacks of the Musi Board Media: (1) it cannot compute large numbers due to the limited number of numbers available on the board; (2) it is inflexible to carry around due to its large size

and lack of audio, so the teacher must explain; and (3) students who do not understand the concept will feel uncomfortable using this media.

Many previous studies have used Musi Board Media in an educational environment, such as research conducted by (1) Asido (2022) "The Effect of Problem Based Learning Model Assisted by Musi Board Media on Learning Outcomes on the Greatest Common Factor Material". In this study using the same media, namely the music board, but the previous researcher used kpk and fpb subject matter in class IV, while the researcher used addition, subtraction and multiplication counting operations with the developed Musi Board Media. There are shortcomings in the previous researcher's media, namely the music board media does not have a long period of use, and therefore the researcher developed the Musi Board Media by changing the material on the music board media. (2) Nurhasanah et al. (2022) The Effectiveness of Using Musi Board Media on KPK and FPB Class IV Elementary School Material. Using the same media the Musi Board this study differs from the previous one in that it focused on class IV subject matter (KPK and FPB), whereas the developed music board media was utilized for addition, subtraction, and multiplication counting operations. Because of some flaws in the prior researcher's media specifically, the short lifespan of the Musi Board Media the researcher modified the music board media in order to further enhance it. (3) Qamita & Rahayu (2024) "Improving Learning Outcomes of Grade V Students on KPK and FPB Materials through Musi Board Media at SDN 1 Birem Rayeuk". This research differs from earlier research that focused on class V subject matter (KPK and FPB) by using the same media, namely the Musi Board. The produced Musi Board Media is used for addition, subtraction, and multiplication counting operations. Researchers altered the Musi Board Media to further improve it because there were some flaws in the media created by earlier researchers, particularly the media's short age. Furthermore, a new methodology was employed in this study; class action research was used in the prior study, whereas the research and development approach was used in this one.

Based on observations made by researchers at SDN Dukuh 08 Pagi, there are several problems in the field of mathematics, especially in addition, subtraction, and multiplication materials. The basic problem experienced by students is the lack of understanding of basic concepts due to the lack of understanding of student reasoning and only paying attention to what is on the blackboard. Teachers using conventional media have not used effective learning media as their learning media. Therefore, the researcher wants to develop Musi Board learning media as effective learning. Therefore, the title of this research is Development of Musi Board Learning Media on counting operation material for grade II elementary school students. Which aims; (1) to test the feasibility of music board media on math arithmetic operations; (2) to see student responses when learning using Musi Board Media on math arithmetic operations; (3) the effectiveness of music board media on math arithmetic operations.

METHOD

The researcher used the Research and Development (R&D) technique as the research methodology. Research and development (R&D) is a type of research centered on successful media development, starting with needs analysis, media testing, and media development stages (Mahfud & Fahrizqi, 2020). The purpose of R&D is to produce media through a testing or verification process so that it becomes valid, practical, and effective media in a predetermined field (Purnama, 2016). In this study, using the ADDIE

development approach. ADDIE as a media development model for building performance-assisted learning (Mahfud & Fahrizqi, 2020).

Through the use of learning media questionnaires and pre-test and post-test questions the Musi Board was tested to find out how effective the learning media is in math arithmetic operations. In this study, questionnaires were collected from media experts, material experts, and students. Likert scale data with four scores was used to create this questionnaire. Experts in the field of media and material concerned provided suggestions and input regarding the qualitative data analysis method. The qualitative value of this qualitative data is then converted into a quantitative value as media quality data. After obtaining the results of validation and responses, continued with descriptive percentage analysis. The percentage results from filling out the questionnaire were calculated using the following formula:

$$P = \frac{f}{N} X\ 100\%$$

with P = percentage number, f = number of scores obtained, and N = maximum number of scores

A calculation to process the questionnaire data using Likert scale will be made to manage the data that has been obtained. Below are the scores used.

Table 1. Questionnaire Assessment Criteria

Category	**Value Weight**
Strongly Agree (SS)	4
Agree (S)	3
Disagree (TS)	2
Strongly Disagree (STS)	1

Quantitative descriptive analysis techniques will be applied to the collected data to obtain conclusions from each element and indicator. The scale shown in the following table will be used to categorize the results of the percentage calculation.

Table 2. Product Feasibility Scale

Achievement Level (%)	**Category**
76-100	Very Feasible
56-75	Worth
40-55	Less Feasible
0-30	Not Feasible

The qualitative data generated from the student response sheet will describe how students act after using the Musi Board learning media in the classroom. The hypothesis of this research is that the Musi Board Media should produce feasible learning media, as well as student responses to the lessons. If the validation results of media experts and material experts reach a minimum of 76% or fall into the very feasible category, then the

media is considered valid or feasible. If the summary of students' reactions to the use of the product reaches more than 76% or at least falls into the interesting category, then this media is considered effective.

The following N-Gain effectiveness interpretation table shows the percentage of effectiveness of learning media.

Table 3. N-Gain Effectiveness Interpretation Table

Persentase (%)	Achievement Level
< 40	Very Ineffective
40 – 55	Not Effective
56 – 75	Moderately Effective
> 76	Very Effective

Source: (Purba et al., 2023)

FINDINGS AND DISCUSSION

Analysis Stage

The researcher saw and spoke with the grade II teacher at SDN Dukuh 08 in the morning to get information about how to do addition, subtraction and multiplication, which students still had difficulty doing. There were several students who could not do addition, subtraction, and multiplication out of 26 students in one class. The researcher found that the use of media by the teacher was still ineffective after the observation. This involves determining the educational resources that students need to improve the quality of their education, such as analyzing learning outcomes based on the Merdeka curriculum at the elementary level as follows:

Table 4. Addition and subtraction learning outcomes

Learning Outcomes
Using contextual problems, students are able to express addition and subtraction operations involving two numbers with two digits in mathematical words

Table 4 shows students' ability to solve problems related to contextual problems related to addition and subtraction operations involving two numbers with two digits in mathematical operations, and Table 5 shows students learning level related to multiplication operations involving two numbers with two digits in mathematical operations.

Table 5. Multiplication learning outcomes

Learning Outcomes
Students can learn about multiplication by expressing it as a multiplication math sentence and then reading the math sentence. They can also learn about multiplication by trying to connect numbers to other numbers, understanding the idea of multiplication and being able to use it, and knowing when multiplication is used. Each of these strategies will help them become more proficient with numbers.

Turning everyday sentences into mathematical sentences helps students learn multiplication and connect numbers with other numbers, as shown in table 5.

Design Stage

In this second stage, researchers design or design the product to be developed. At this stage begins with the creation of the design, the suitability of the media to the needs of students in class II as well as in terms of the form of media to be developed. 1) The media to be developed is conventional media, namely music board media used for counting operations. 2) This media can be used for addition, subtraction and multiplication counting operations in class II. 3) This media is made from an 80 cm x 80 cm board covered with zinc and numbers 1-100.

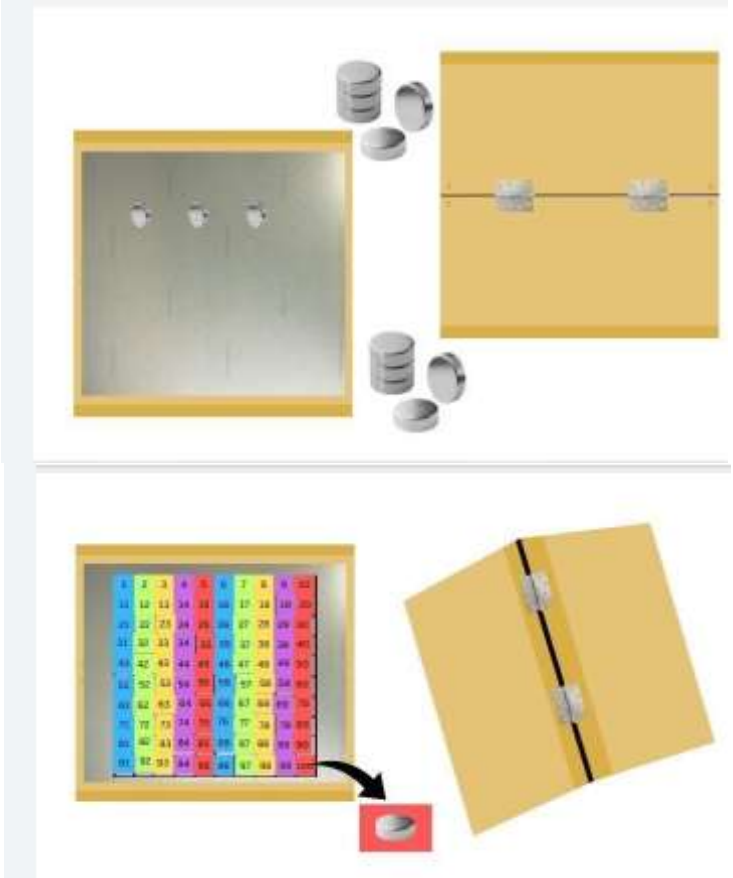

Figure 1. Initial Media Design

In the image above, the Canva app was used to design the media. In the image, there are pictures of numbers 1 to 100, magnetic toys, zinc, and a board. The magnetic toys are attached to the board with zinc, which attracts students' attention to learn addition, subtraction, and multiplication.

Model Development Stage

In the third stage, namely the development stage, where in this stage is the realization of the previous stage, namely the design stage. Previously, the design stage only made a conceptual framework, so the product was made in this development phase. a learning device product that is ready to be implemented.

Figure 2. Musi Board Media

At this stage of development, researchers began to make media boards and the updates made were using a board with a plate coated and coated with numbers 1-100 and then making this board bendable by providing a hinge in the middle of the board and preparing magnets that show numbers when this media is used.

The Musi Board learning media must be validated and tested for feasibility. Muhammadiyah Prof. Dr. Hamka University two learning media lecturers, from the media validation experts. Table 6 shows the responses and input from the media experts on the developed Musi Board Media.

Table 6. Media Expert Validation

Assessment Aspect	Percentage		
	Media Expert 1	Media Expert 2	Category
Visual	100%	94%	Very Feasible
Technical	88%	88%	Very Feasible
Usage Guide	100%	88%	Very Feasible
Typography	100%	88%	Very Feasible
Attractiveness	100%	92%	Very Feasible
Average	94%		Very Good

The recapitulation results of Table 6 show the media expert validation and assessment percentages of 94% and 95%, respectively putting them in the Very Feasible category. This Musi Board learning media has met the validity criteria, so it is clear that it is worth using. Table 6 shows that the visual aspect shows an assessment percentage of 100% and 94% because this Musi Board Media has a neat and attractive visual form. In the technical aspect, it gets the same score of 88% because this Musi Board Media uses materials that are safe for use in elementary school students. In the aspect of usage guidelines, it gets 100% and 88% because this Musi Board Media is easy to use for teachers and in the Musi Board Media has been attached to the procedure for using the media in the form of a barcode. The typography aspect scored 100% and 88% because this Musi Board Media has an attractive appearance and impression for elementary school students. The attractiveness aspect received a score of 100% and 92% because this Musi Board Media has an attraction that makes users want to use it, especially students, this

magnetic toy and zinc-coated board makes students curious about sticking it so that students scramble to use this Musi Board. The suggestion from media expert 1 is to cut or refine the edges of magnetic toys so that they can be used more safely and harmlessly for students. Media expert 2 also gave advice to refine the edges of magnetic toys so as not to endanger students because this Musi Board learning media is considered to have an attractive color selection and excellent design. By paying attention to these five aspects, it is appropriate to develop a teaching media that can support students in their learning. This is in accordance with the learning media according to Ninawati & Wahyuni (2021) that learning media is a tool for educational tasks that can facilitate learning.

The material expert validator consisted of 1 mathematics lecturer at Prof. Dr. HAMKA Muhammadiyah University. The results of the material assessment can be seen in Table 7.

Table 7. Material Expert Validation

Assessment Aspect	Percentage	Category
Media Suitability with Material	100%	Very Feasible
Content	96%	Very Feasible
Attractiveness	88%	Very Feasible
Average	95%	Very Feasible

The aspect of assessing the suitability of the media to be included in the results of the material expert validation. Content, and attractiveness obtained a score of 95% in the category of very feasible results. In table 7, the aspect of media suitability with the material received a score of 100% because the questions used were in accordance with how to solve using the Musi Board Media. The material content aspect scored 96% because the material and learning topics used in this study are very suitable for the media used. The aspect of attractiveness scored 88% because the use of material with teaching media makes learning more interesting and motivates to learn with interest. This is according to Nurrita (2018) the selection of teaching media development can increase student learning motivation.

Implementation Stage

Products that have been developed are then applied and used in this fourth stage. Trials in real conditions. The Musi Board learning media was implemented for SDN Dukuh 08 Pagi students in class II, totaling 26 people. To determine whether the Musi Board learning media can be used in learning arithmetic operations. Table 8 shows the results of student responses.

Table 8. Recapitulation of Student Response

Indicator	**Description (%)**			
	STS	**TS**	**S**	**SS**
Media Attractiveness	0%	0%	9%	91%
Clarity of Media Images	0%	2%	6%	92%
Color Brightness	0%	0%	12%	88%
Usage Guidelines and Directions	0%	0%	18%	82%
Number Clarity	0%	0%	12%	88%
Easy to understand language	0%	4%	6%	90%
Level of student Interest in Media	0%	0%	3%	97%
Student Engagement Level	0%	2%	12%	86%
Ease of Media Use	0%	2%	15%	82%
Average	96%	Very Interesting		

The results of student responses to this Musi Board teaching media received an average percentage of 96% in the very interesting category. Based on the results of student responses, the indicator that gets the highest score is the seventh indicator which gets a score of 97% because this media has attractive colors, large size, bright colors that make students curious about this media when introduced in class. Then there are two indicators that get the lowest score, namely the guidance and usage indicators, which get a score of 82% because in this media there is a barcode for using the media that can be scanned which functions to see the guidelines for using this media, but because elementary students are not allowed to use *cellphones* so this feature cannot be used by students, therefore this indicator gets a low score compared to other indicators, but still this media has a function to facilitate communication between the person sending the message and the person receiving it, so that there is no difficulty in conveying verbal language or misperception (Ibrahim et al., 2023). The indicator that gets a low score is the ninth indicator of ease of use of the media because the media is very easy to use and understand but there are some students who have difficulty using this media, especially in multiplication problems, therefore this media gets a low score of 82% on this indicator, but this media gets a good score from other students and learning media functions as a tool in the learning process that allows communication between teachers and students besides that teaching media also encourages student interest in participating in learning activities well.

Table 9. Average Results of N-Gain Scores for Experimental Group

	Experiment Class N-Gain Score
Average	59.26
Minimum	20.00
Maximum	100.00

The calculation of the average N-Gain test score of the experimental group after using the Musi Board Media is 59.26% so that it is included in the "Quite Effective" classification. The minimum N-Gain score is 20% and the maximum is 100%.

Evaluation Stage

The fifth stage is evaluation. At this point, conclusions are drawn and the assessment results are evaluated. The results of the questionnaires collected from media experts, material experts, and students show that the learning media board is a good choice for students. Table 10 shows the statistical analysis conducted to evaluate the N-Gain scores using the independent T-test.

Tabel 10. Result of Paired T-Test

Paired Samples Test

		Paired Differences							
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std.Error Mean	Lower	Upper	T	df	Sig. (2-tailed)
Pair 1	Pre Test – Post Test	-28.462	11.204	2.197	-32.987	-23.936	-12.936	25	0.000

The data in the Table 10 shows that the development of Musi Board Media for addition, subtraction and multiplication arithmetic operations is complementary in understanding the material in class. Weaknesses in understanding the material that teachers usually use students and teachers do not use real media, so students lack understanding of the material in class. We found that the calculation results from the table above have a Sig. (2-tailed) 0.000, which means that this result has a significant impact on the development of Musi Board Media in addition, subtraction, and multiplication operations, in accordance with the use of learning media in the educational process can assist in the development of successful learning outcomes for students and serve as a useful tool for organizing learning activities (Safitri et al., 2023).

The material expert reported that the media had a feasibility percentage of 94% and the media expert 95% stated that the arithmetic operation learning board media was "Very Feasible" with a feasibility percentage of in addition, most of the 96% student responses fell into the "very interesting" category. With an N-gain value of 59.26%, the effectiveness of utilizing Musi Board medium for math arithmetic operations falls into the "Moderately Effective" group.

The average value of the N-gain score for the Musi Board Media, including the effective category, is 59.26% according to the results of the N-gain score test calculation. Then it can be said (Mardhiah & Akbar, 2018) that grade II elementary school pupils benefit from using Musi Board Media to practice counting operations in their math classes. Based on the fact that learning media can help students to present data more effectively, comprehend concepts better, and compile information more easily, they are thought to be an excellent tool for enhancing student learning outcomes, information processing and consolidation.

CONCLUSION

The results of the discussion show that the Musi Board Media is very useful to help Grade II students learn addition, subtraction, and multiplication operations. The extremely fascinating category yielded an average percentage of 96% in the student answers to this Musi Board instructional medium. Students rated the Musi Board Media as an interesting tool to help them learn addition, subtraction and multiplication operations. It is possible that there is a real difference between the Musi Board Media and math arithmetic operations, as shown by the analyzed data of the Musi Board Media arithmetic operations the Sig. (2-tailed) value of 0.000 is less than 0.05. According to the findings of the student replies, the seventh indicator—which receives a score of 97%—has the highest rating because it features eye-catching hues, a big size, and vibrant colors that pique students' interest when it is brought to the class. There are two indicators that receive the lowest score, which are the guidance and usage indicators. These indicators receive an 82% because the media has a barcode that can be scanned to view the usage guidelines. Since elementary school students are not permitted to use cellphones, this feature cannot be used by students, so that it can be a chance for the next researcher to analyse this media that has barcode with the other level like secondary or high school level.

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