

DEVELOPMENT OF TEACHING MEDIA OF MULTIPLICATION KETUPAT (KETUPEL) ON IMPROVING THE ABILITY TO COUNT MULTIPLICATION OF GRADE III ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

Ketupel media is a media developed, using board material with a size of 40 cm x 40 cm and in the form of a diamond that raises local wisdom in the month of Ramadan. This research aims to develop teaching media for multiplication ketupat (Ketupel) on the ability to count multiplication of third grade elementary school students. The research subjects are third grade elementary school students. The type of research to be conducted is research and development (R&D). The development model of this research is the ADDIE development model, namely Analysis, Design, Development, Implementation, Evaluation. At the planning stage, interactive media was designed using Ketupel media. After completion of the design, it was validated by material experts and media experts. The results of the material experts obtained 92% with valid criteria, while the media experts obtained 92% with valid criteria. After the media is declared valid then the media is implemented on grade III elementary school students, with the results of the N-gain Score of 66% indicating that the media is quite effective in use. And the results of student questionnaires after implementation with 95% results show the media is very interesting. It can be concluded that Ketupel Media can improve students' multiplication counting skills.

KEYWORDS Counting skills, Ketupel teaching media



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INTRODUCTION

Holistically, education is a process that is carried out in a conscious and planned manner to create an active learning process in terms of the process of self-development in order to have spiritual abilities, personality, and self-control. (Sirojuddin, 2020). Education is a process to gain learning experiences in order to

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change and develop an attitude through the learning process, especially in elementary schools. Elementary school students are in a phase of cognitive development that is bound by concrete objects that can cause an analysis if perceived with the five senses.

One of the lessons that can develop cognitive abilities in elementary school is mathematics. According to Putu Wulan Pratami Dewi & Ngurah Sastra Agustika, (2020) and Priyatna et al., (2023) Mathematics is a science that has an important role in everyday life to solve problems regarding calculations, such as division, multiplication, subtraction, and addition. Mathematics is one of the compulsory lessons at the elementary school level. Addition, subtraction, multiplication, division are the four basic components in Math arithmetic operations.

Numeracy skills are the first or basic step in the process of learning Mathematics at school. A student is required to be able to understand counting activities before recognizing other activities in Mathematics learning. (Sari et al., 2020). Because in the ability to count there are several indicators that must be met. According to (Pujiono et al., 2022) indicators that must be met are as follows (1) have the ability to solve problems and be able to create problems along with how to solve them (2) explain the properties of counting operations of small numbers contained in Basic Competency 3.1, including a) determining one or two numbers in the form of multiplication using the properties of multiplication b) making problems with solutions based on the properties of multiplication (3) perform multiplication operations of small numbers up to 100 using concrete objects, images, and mathematical symbols.

However, learning Mathematics is a frightening specter for some students. Because students find it difficult to understand the lesson (Matulesy & Muhiid, 2022). This was reported by interviews conducted by the third grade math teacher, SDN Utan Panjang 01 in operating multiplication students have difficulty during the calculation process. After an interview with the third grade teacher of SDN Utan Panjang 01, out of 27 students in one class there were 10 who were categorized as fluent, 1 student with special needs who could not multiply at all, and the rest were categorized as intermediate. According to the third grade teacher at SDN Utan Panjang 01, students find it difficult to work on multiplication of tens by stacking down. One of the efforts that can help improve the learning process is to use concrete media in learning.

Media is a tool that is applied to convey messages in the learning process. (Rohani, 2020). The media developed in this research is Ketupel media. The multiplication rhombus media (Ketupel) is a modification of the cross-line media. According to (Cahyani & Lestari, 2024) *cross-line* technique is a technique of crossing straight and horizontal lines, then given a point on the crossing of the line and then summed. *Cross-line* media is one of the techniques used in facilitating multiplication calculations using line crossing points, such as horizontal and vertical lines that are crossed, then given a point at the intersection and calculated the number of points. (Nuranifah et al., 2022). Therefore, Ketupel media can be applied well because students can demonstrate it and get new experiences. It is called Ketupel because the media that researchers will develop is in the shape of a

diamond. Researchers chose the ketupat shape because researchers wanted to link the media with local wisdom in Indonesia during the month of Ramadan.

In this research, the author wants to develop Ketupel media by using the cross-line multiplication technique. Previous research using *cross-line* media was conducted by (Fasya et al., 2023), (Nuranifah et al., 2022), and (Amaliyah et al., 2023) effective on improving multiplication counting skills. The difference between my research and previous research is using development research and using teaching media with the theme of local wisdom, namely ketupat which characterizes the Indonesian state in the month of Ramadan. The objectives of this study are (1) to develop a multiplication ketupat media (Ketupel) to improve the ability to count multiplication (2) to test the feasibility of multiplication ketupat media (Ketupel) to improve the ability to count multiplication (3) to see students' responses in applying multiplication ketupat media (Ketupel) to improve students' counting skills. Based on the things that have been described, the researcher conducted a study with the title Development of Teaching Media for Multiplication Ketupat (Ketupel) on Improving the Multiplication Counting Ability of Third Grade Elementary School Students.

RESEARCH METHOD

Research is the most important part in the process of building science (Nina Adlini et al., 2022). In general, research has three objectives, namely discovery, proof, and development. Development research is carried out to re-explore previous research (Ridwan et al., 2021). The research model used in this study is *Research and Development* (R&D) research. Research and development (RnD) is research that aims to provide innovation in an existing product. Development research is research that is used to develop and test products that will be developed in the world of education. (Maydiantoro, 2021). In the world of education, development research (RnD) focuses on developing a design or model of teaching materials (Prananda, et al., 2020). (Prananda, et al., 2020).. Development research is an observation process carried out to provide innovation in previous research. The development model of this research is the ADDIE development model, namely *Analysis, Design, Development, Implementation, Evaluation*.

The subjects of this research trial were third grade students of SDN Utan Panjang 01 in the 2023/2024 school year with a total of 26 students. Third grade students consist of 16 male students and 10 female students. The types of data in this study are primary and secondary data. Primary data is data obtained directly by students who are taken through validity and practicality testing questionnaires and giving learning outcomes tests to students. The first data is in the form of Ketupel media validation scores given by lecturers (media and material expert validators). The second data is in the form of practicality test results through student response questionnaires after the Ketupel media is tested.

In this study, the data collection instrument used was a validity sheet. The validity sheet used to determine whether the Ketupel media that has been designed is valid or not. Anilisis Ketupel media with the formula to determine validity.

$$p = \frac{F}{N} \times 100\%$$

Description:

P = Feasibility Presentation, F = Score obtained, N = Highest score (Sujiono, 2000).

To manage the questionnaire data that has been collected, a calculation will be made for processing the questionnaire data using a Likert scale. The scores used are given below.

Table 1. Questionnaire Assessment Criteria

Category	Value Weight
Strongly Agree (SA)	4
Agree (A)	3
Disagree (D)	2
Strongly Disagree (SD)	1

Giving an assessment of the validity criteria of the learning media can be seen in table 2.

Table 2. Validity Assessment Criteria

S_v	Criteria	Description
$76\% \leq S_v < 100\%$	Valid	No revision needed
$50\% \leq S_v < 76\%$	Fairly Valid	Minor revisions
$26\% \leq S_v < 50\%$	Less Valid	Major revisions
$0\% \leq S_v < 26\%$	Invalid	Not feasible, needs revision

Source: (Syafrudin & Sujarwo, 2019)

To find out how effective the ketupel media used in third grade students of SDN Utan Panjang 01 is, the N-Gain test is carried out using the *pretest* and *posttest*.

Table 3. N-Gain Effectiveness Interpretation Categories

Effectiveness Interpretation Category	
N-Gain Score	
Percentage (%)	Interpretation
<40	Ineffective
40 - 55	Less Effective
56 - 75	Effective Enough
>76	Effective

Source: Hake. R.R, 1999

RESULT AND DISCUSSION

The development of Ketupel Media on multiplication material for grade III Elementary School goes through 5 stages, namely *Analysis, Design, Development, Implementation, Evaluation*. The results of these stages are as follows.

Analysis Stage

In the analysis stage of the ADDIE model, the curriculum analysis, needs analysis and student problems are carried out. Curriculum analysis is used to adapt Ketupel media multiplication material to the K-13 curriculum, so that the material loaded with KD, Indicators in the syllabus and learning objectives to be achieved. The current curriculum for third grade students of SDN Utann Panjang 01 is still using K-13.

The needs analysis focused on students' problems with learning Mathematics. This was reported by interviews conducted by the third grade math teacher, SDN Utan Panjang 01 in operating multiplication students have difficulty during the calculation process. After an interview with the third grade teacher of SDN Utan Panjang 01, out of 27 students in one class there were 10 who were categorized as fluent, 1 student with special needs who could not multiply at all, and the rest were categorized as intermediate. According to the third grade teacher at SDN Utan Panjang 01, students find it difficult to work on multiplication of tens by stacking down. This is because there are still students who feel confused because they do not understand the concept. Therefore, researchers developed Ketupel media to help students operate multiplication. Ketupel media uses cross-line multiplication techniques with this concept, so in counting skills students do not need to memorize multiplication simplifies multiplication counts, and is interesting because there is an element of drawing. (Nuranifah et al., 2022).

Planning stage (Design)

After analyzing the problems and needs, researchers began to design the product. This product design is still conceptual in nature which will be used in the implementation of the learning process. In facilitating the initial design can apply the *storyboard*. And at this stage researchers make validation sheets and student response questionnaires. The product development design that researchers will do is as follows.

- a. The teaching media that researchers will develop is Ketupel media which is used to improve multiplication counting skills. Ketupel media is conventional with visual media category.
- b. Ketupel media integrates the *cross-line* multiplication method. Ketupel media will be made with plywood media that will be designed in the shape of a diamond with a size of 40 cm x 40 cm and velcro adhesive which will be used as a line.

The following is a draft image of the Ketupel media that has been developed.

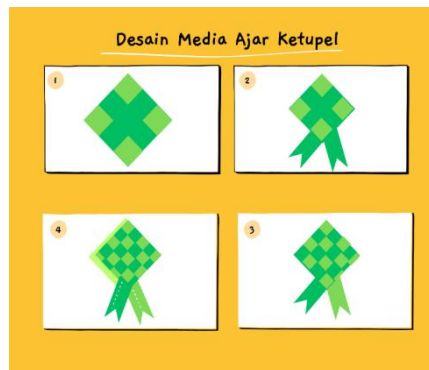


Figure 1. Ketupel Storyboard Design

Development Stage

After going through the analysis and design stages, researchers develop and realize the product design. The result of this stage is a product that will be validated by material, media, and language experts. After validating, the results will be in the form of suggestions that are used to be applied in media development. The following is the Ketupel media that has been developed.



Figure 2. Ketupel Media

At this stage, Ketupel media must be validated and tested for feasibility which will be carried out by 2 lecturers of media experts at Muhammadiyah Prof. Dr. HAMKA University and 1 lecturer of media material experts at Muhammadiyah Prof. Dr. HAMKA University. The following are the results of the validation of media experts and material experts.

Table 4. Media Expert Validation

Aspects	Percentage		Description
	Media expert 1	Media expert 2	
Visual	88%	88%	Valid
Technical	88%	88%	Valid
Usage Guidelines	75%	88%	Valid
Typography	100%	100%	Valid

Attractiveness	100%	100%	Valid
Average	92%		Valid

Table 5. Material Expert Validation

Aspects	Material expert 1	Description
Material feasibility	96%	Valid
Material delivery	94%	Valid
Attractiveness	88%	Valid
Average	92%	Valid

Implementation Stage

When it has been declared valid by the three validators, it is tested in one class. In class III SDN Utan Panjang 01 with 27 students. Beginning with doing a pretest to find out the extent of students' counting skills. Ended by doing a posttest to find out the effectiveness of Ketupel media on students' counting skills. After the trial, students were given a questionnaire to find out the ease or usability of teaching media used by students. Teaching media is said to be practical if the results of the practicality assessment are categorized as good, but if it has not shown practicality, revisions will be made according to the suggestions and respondents. The following are the results of the normality test which aims to determine whether the research data is normally distributed

Table 6. Normality Test Results

One-Sample Kolmogorov-Smirnov Test

		Pretest	Posttest
N		26	26
Normal Parameters ^{a,b}	Mean	62.6731	86.9038
	Std. Deviation	17.19531	9.87018
Most Extreme Differences	Absolute	.127	.138
	Positive	.116	.092
	Negative	-.127	-.138
Test Statistic		.127	.138
Asymp. Sig. (2-tailed)		.200 ^{c,d}	.200 ^{c,d}

- a. Test distribution is Normal.
- b. Calculated from data.
- c. Lilliefors Significance Correction.
- d. This is a lower bound of the true significance.

The following are the results of the T-test which aims to determine whether there is a change in improving counting ability before and after being given behavior.

Table 7. T-test Results

Group Statistics										
	Grup	N	Mean	Std. Deviation	Std. Error Mean					
Nilai	Pretest	26	62.6731	17.19531	3.37228					
	Posttest	26	86.9038	9.87018	1.93570					

Independent Samples Test										
		Levene's Test for Equality of Variances				t-test for Equality of Means				
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
Nilai	Equal variances assumed	9.957	.003	-6.232	50	.000	-24.23077	3.88834	-32.04073	-16.42081
	Equal variances not assumed			-6.232	39.861	.000	-24.23077	3.88834	-32.09026	-16.37128

The following are the N-Gain results which aim to determine the effectiveness of the media used using the *pretest* and *posttest* tests.

Table 8. N-Gain Score Test

Descriptive Statistics					
	N	Minimum	Maximum	Mean	Std. Deviation
Ngain_Score	26	.05	1.00	.6675	.21645
Ngain_Persen	26	4.76	100.00	66.7502	21.64456
Valid N (listwise)	26				

Table 9. Recapitulation of Student Response

Aspects	Relevance			
	SD	D	A	SA
Media is easy to use	0%	0%	24%	76%
Media can be used independently without assistance	0%	0%	18%	82%
The media is in accordance with the concept of the material being studied	0%	0%	15%	85%
Media can attract student learning motivation	0%	0%	18%	82%
Media is used to increase students' curiosity	0%	0%	15%	85%
Appropriateness of size and color in the media	0%	0%	21%	79%
The durability of the media made	0%	0%	12%	88%
Media capabilities for students	0%	0%	3%	97%
Clarity of media for students	0%	0%	12%	88%

Guidelines and directions for using the media	0%	0%	12%	88%
Average Presentation Category	95% Very Interesting			

Evaluation Stage

At this stage, researchers draw conclusions after carrying out the implementation and validation stages related to the Ketupel media that has been developed. By collecting questionnaires from media experts, material experts and student responses. The goal is to determine the effectiveness of Ketupel media in the subject of Mathematics multiplication material.

Discussion

Presentation of the results of media validation conducted by 2 media expert lecturers at Prof. Dr. HAMKA Muhammadiyah University, in table 4 shows the results of the validation conducted by media experts. In the visual aspect, the two media experts showed a percentage of 88%, this shows that Ketupel media has a visual form that can attract students because the colors used are attractive. In the technical aspect, both media experts showed a percentage of 88%, this shows that Ketupel media has materials that are safe to use and safe to use. In the aspect of usage guidelines, it shows a percentage of 75% and 88%, this shows that Ketupel media has practical stages and steps. In the typography aspect, both media experts show a percentage of 100%, this shows that Ketupel media has a size that matches the media criteria. The media should be designed to be practical, flexible, and resistant, the media used can be used anywhere, and easily moved anywhere. (Cahyadi, 2019). In the aspect of attractiveness, both media experts showed a percentage of 100%, this shows that Ketupel media can provide a new atmosphere in terms of learning and become media that can attract student participation. It can be concluded that the final percentage obtained by the media expert is 92%. This shows that Ketupel media is categorized as very feasible to use and implement in elementary schools.

Table 5 is the result of material expert validation conducted by 1 material expert lecturer at Prof. Dr. Hamka Muhammadiyah University showing a percentage of 94% categorized as very feasible. In the aspect of media feasibility, material experts show a percentage of 96%, this shows that Ketupel media is in accordance with the curriculum and syllabus. In the aspect of material content, the material expert shows a percentage of 94%, this shows that Ketupel media is in accordance with the basic competencies, indicators, and learning objectives. Learning media that is in accordance with learning objectives will help students in the learning process.(Yanti et al., 2023) In the aspect of attractiveness, material experts show a percentage of 88%, this shows that Ketupel media can foster and provoke student interest. With the results of the percentage obtained by the material expert showing a result of 92%, the Ketupel media is in accordance with the material implemented in elementary schools, especially in class III Mathematics lessons on multiplication material.

Table 6 shows the results of the normality test on the results of the research data calculated using the SPSS application. According to Kismono & Dewi, (2021) the purpose of the normality test is to determine whether the research data (pretest and posttest) is normal or not. The requirement for the normality test is $sign > 0.05$. From the results of the normality test in table 6, it is known that the significance value of the pretest and posttest results shows 0.20. It can be concluded that the research data is normally distributed.

Table 7 shows the results of the T-test on the results of student research data using the SPSS application. According to (Rohmawati & Kustomo, 2020) the purpose of the T-test is to test the research data, whether there is a difference after and before the behavior is given. The requirement for the T-test is $sign < 0.05$. It can be seen that based on the T-test in table 7, the sign value is $0.003 < 0.05$. It can be concluded that there is a difference in students' multiplication counting ability when before and after using Ketupel media.

Table 8 is the result of N-Gain *pretest* and *posttest* students who have been calculated with the SPSS application N-Gain test is used to determine the improvement after treatment.(Kamagi et al., 2022). With the N-Gain results showing the results of 59% with the category quite effective. This shows that Ketupel media is quite effective in improving the ability to count multiplication of third grade students of SDN Utan Panjang 01.

Table 9 is a recapitulation of student responses that have been implemented on 27 third grade students of SDN Utan Panjang 01. The recapitulation of student responses is in the form of a questionnaire distributed to students after the Ketupel media is implemented. From the results of the recapitulation shows a percentage of 95%. This makes Ketupel media suitable for use, can attract student motivation, and help students in calculating multiplication. The cross-line method involves students in concrete learning so that students do not get bored quickly, and involves students in effective learning. (Ulwiyah & Ragelia, 2020). Because the ketupel media uses *cross-line multiplication* techniques that can help students calculate multiplication without eliminating multiplication concepts. In the aspect of media capability, the percentage result is 97%, this shows that after students implement Ketupel media, students get various learning experiences and show improvement at the end of learning. In the media aspect, it is easy to get a percentage result of 76% making the media quite easy to use by students but the number of media is limited.

CONCLUSION

From the results of the study, it was obtained that the Ketupel learning media developed by the ADDIE model (*Analysis, Design, Development, Implementation, Evaluation*) was categorized as suitable for use. This is based on the results of validation conducted by 2 media expert lecturers and 1 material expert lecturer showing a percentage of 92%. It can be concluded that Ketupel media is feasible to be implemented in elementary schools. Ketupel media is a media that can attract students' interest in learning Mathematics multiplication material and in accordance with school learning objectives. This is indicated by the results of the N-gain test with a percentage of 59% indicating that Ketupel media is quite effective in

improving students' multiplication counting skills. And based on the response questionnaire, the percentage of 95% shows that Ketupel media is interesting for students. It can be concluded that Ketupel media is a media that can create a new atmosphere for students and in accordance with the learning objectives to be achieved.

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