

Development Interactive Media of Multiplication Materials With Line Technique (Garismatika) for 3th Grade Elementary School

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Abstract: The purpose of this research is to produce interactive media development of multiplication material with linematics techniques for grade 3 elementary school, to find out the quality of interactive media that is appropriate to be used to help teachers deliver learning materials and assist students in working on multiplication problems with linematics techniques. The research method used is Research and Development (RnD). The research model uses ADDIE which is an acronym for the research steps, namely Analysis, Design, Development, Implementation, and Evaluation. The results obtained during the study were the assessment of the testing phase. The assessments obtained from material experts are 65% with proper criteria, media experts are 92.5% with very decent criteria, and linguists are 95% with very decent criteria. The media feasibility test is a field test conducted at SD Negeri Kuripan 01 by 1 teacher with a score of 97.5% with very decent criteria and one class student getting a score of 93.8% with very decent criteria. Based on the results of tests that have been carried out from beginning to end, it shows that the media developed in this study is feasible to be used in learning or learning activities.

Keywords: Keyword 1; Keyword 2; Keyword 3; Keyword 4; Keyword 5. (10pts separately by a semicolon)

1. Introduction

National Education according to the 1945 Constitution is a democratic education that aims to build a democratic society. A democratic national education system does not deny the fact that there are differences in the levels of human intelligence as a divine gift. The democratic education system is to provide equal opportunities for all people

according to their respective abilities and talents to obtain quality education [1]. The purpose of education is a description of the philosophy or view of human life, both individually and in groups. Discussing the purpose of education will involve a system of values and norms in a cultural context, both in myth, belief and religion, philosophy, ideology and so on [2].

The rapid development of information and communication technology has resulted in a shift in the role of teachers in learning. The teacher is not the only source of information in learning but as a facilitator. Teachers need supporting media that can be used as alternative sources of information in teaching. Learning media is a tool that functions and is used for learning messages. Learning is a process of communication between learners, teachers and teaching materials [3]. One type of technological innovation in teaching materials that can be used in schools is teaching materials or interactive media.

The use of media in learning helps teachers to convey material easily, so that students can understand the material to be delivered. Teachers must know the characteristics of students and the material to be delivered. The design of learning media can be done with the help of several software, one of which is Adobe Flash software. Adobe Flash software can be used for mathematics learning media. Mathematics is one component of a series of subjects that have an important role in education. Mathematics is one of the fields of study that supports the development of science and technology. Many students have difficulties in doing math problems [3]. This is proven based on the results of interviews with classroom teachers that the mathematics learning process in class is still not running optimally, because most students are busy playing with their

classmates which makes the class less conducive. The teacher in delivering the material only uses the lecture method and question and answer one by one with students using the deposit technique, so that it does not stimulate students to be actively involved in the learning process. Mathematics subjects are often considered by students to be difficult and scary. The results of daily tests on mathematics subjects, especially multiplication material, the average value of students is still low, because there are still many students who get scores below the Minimum Completeness Criteria (KKM). The homeroom teacher determines the KKM (Minimum Completeness Criteria) is 70. There are 34 students in grade 3. Students who have not completed as many as 29 students, with a percentage of 85%. Students who have completed as many as 5 students, with a percentage of 15%.

Based on the problems above, the researchers developed an interactive media for multiplication material with the 3rd grade elementary school linematics technique which has been tested for feasibility based on test results by experts, students and teachers.

2. Related Works/Literature Review

According to Sumardiono, mathematics learning is a deliberate activity to modify conditions to achieve goals through reasoning activities so that abstract and socio-cultural mathematical objects are conveyed [4].

Multiplication according to Muchtar can be defined as repeated addition. For example, the multiplication of 4×3 can be defined as $3 + 3 + 3 + 3 = 12$, while 3×4 can be defined as $4 + 4 + 4 = 12$. Conceptually, 4×3 is not the same as 3×4 , but if seen the result only then $4 \times 3 = 3 \times 4$. Thus the multiplication operation fulfills the nature of exchange [5].

Learning mathematics is strongly influenced by understanding the concept and also accuracy. In learning mathematics students will definitely experience difficulties, thus allowing students to make mistakes in solving math problems [6].

3. Material & Methodology

3.1. Data

The data in this study include media assessment sheets by material experts, media experts, and linguists. The data from this stage is in the form of a 4-scale questionnaire instrument consisting of 10 questions about the feasibility of the media developed from the point of view of the expert appraiser. Meanwhile, supporting data from the side of media users, in this case teachers and students, were given in the form of a 4-scale questionnaire to see user responses to the developed media.

The data obtained from the test results were analyzed using the following formula (Fitriana, 2014):

$$P = \frac{\sum X}{\sum Xi} \times 100\%$$

Information:

P : Percentage

$\sum X$: Total respondents' answers on 1 item

$\sum Xi$: Highest number of answers in 1 item

After obtaining the average assessment data from experts, students and teachers based on the formula, the data is converted into qualitative form according to the following media eligibility criteria:

Table 1. The feasibility of media [7]

No	Score in percent (%)	Eligibility category
1	< 21%	Very improper
2	21-40%	Not feasible
3	41-60%	Decent enough
4	61-80%	Worthy
5	81-100%	Very decent

3.2. Method

The type of research conducted is research and development or Research and Development (RnD). The development model used in this study is ADDIE which is an acronym for Analysis, Design, Development, Implementation, and Evaluation which are research steps. The advantage of this model, which is seen from its systematic working procedure, is that each step of development that will be followed always refers to the previous step, so that it is expected to obtain an effective product for learning [8].

The trial data for the feasibility of media products in this study begins with testing the feasibility from an expert's point of view. As for the 3 experts used in this study, namely material experts to consider the feasibility from the point of view of the content / content of the lesson in the developed media, the second is a media expert to test and give an assessment from a technical point of view, appearance, and other provisions from the development side. media, the third is a linguist to assess the feasibility of the media from the linguistic side.

Furthermore, after making improvements according to expert advice, three times the media trial data collection was carried out, namely the one-on-one test, small group test, and field tests conducted in different schools. The one-on-one test was conducted by the class teacher and 3 students at SD Negeri Kuripan Kidul 01, the small group test was conducted by the class teacher and 5 students at SD Negeri Kuripan Kidul 03, and the field test was conducted by the class teacher and one class of students with a total of 23 students at SD Negeri Kuripan 01.

4. Results and Discussion

4.1. Result

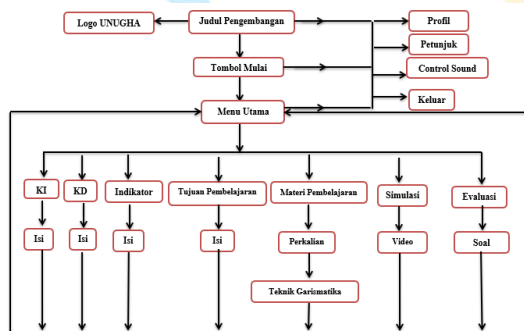


Fig 1. Flowchart of Development of Interactive Media for Multiplication Materials with Linematic Techniques



Fig 2. Example of Media Display

Table 2. Quantitative Data Analysis Results of Material Expert Assessment

No.	Butir Pernyataan	Skor		Presentase (%)	Tingkat Kelayakan
		X	Xi		
1.	Kelengkapan materi	3	4	75	Layak
2.	Keterkaitan materi	3	4	75	Layak
3.	Keakuratan konsep dan definisi	3	4	75	Layak
4.	Keakuratan fakta dan data	2	4	50	Cukup Layak
5.	Keakuratan soal	3	4	75	Layak
6.	Keakuratan gambar, diagram, dan ilustrasi	2	4	50	Cukup Layak
7.	Kesesuaian materi dengan perkembangan ilmu	3	4	75	Layak
8.	Gambar, diagram, dan ilustrasi aktual	2	4	50	Cukup Layak
9.	Keruntutan konsep	2	4	50	Cukup Layak
10.	Penyajian materi mudah dipahami	3	4	75	Layak
Analisis seluruh data		26	40	65	Layak

Table 3. Quantitative Data Analysis Results of Media Expert Assessment

No.	Butir Pernyataan	Skor		Presentase (%)	Tingkat Kelayakan
		X	Xi		
1.	Kelengkapan materi	3	4	75	Layak
2.	Keterkaitan materi	3	4	75	Layak
3.	Keakuratan konsep dan definisi	3	4	75	Layak
4.	Keakuratan fakta dan data	2	4	50	Cukup Layak
5.	Keakuratan soal	3	4	75	Layak

6.	Keakuratan gambar, diagram, dan ilustrasi	2	4	50	Cukup Layak
7.	Kesesuaian materi dengan perkembangan ilmu	3	4	75	Layak
8.	Gambar, diagram, dan ilustrasi aktual	2	4	50	Cukup Layak
9.	Keruntutan konsep	2	4	50	Cukup Layak
10.	Penyajian materi mudah dipahami	3	4	75	Layak
Analisis seluruh data		37	40	92,5	Sangat Layak

Table 4. Quantitative Data Analysis Results of Linguist Expert Assessment

No.	Butir Pernyataan	Skor		Presentase (%)	Tingkat Kelayakan
		X	Xi		
1.	Menggunakan bahasa yang baik dan benar	4	4	100	Sangat Layak
2.	Menggunakan bahasa yang digunakan komunikatif	4	4	100	Sangat Layak
3.	Bahasa yang digunakan jelas dan mudah dipahami oleh siswa	4	4	100	Sangat Layak
4.	Keterbacaan pesan	4	4	100	Sangat Layak
5.	Ketepatan penggunaan kaidah bahasa	3	4	75	Layak
6.	Kalimat diawali huruf kapital	4	4	100	Sangat Layak
7.	Penggunaan bahasa yang digunakan dalam media mudah dipahami	4	4	100	Sangat Layak
8.	Keruntutan dan keterpaduan antar paragraf.	3	4	75	Layak
9.	Konsisten menggunakan istilah	4	4	100	Sangat Layak
10.	Kesesuaian pemakaian jenis huruf mudah dipahami	4	4	100	Sangat Layak
Analisis seluruh data		38	40	95	Sangat Layak

Table 5. Teachers Assessment Results

No	Trial	Score Appraisal	Eligibility category
1	Initial Testing	92,2%	Very decent
2	Main trial	97,5%	Very decent
3	Operational Trial	97,5%	Very decent

Table 6. Students Assessment Results

No	Trial	Score Appraisal	Eligibility category
1	Initial Testing	89,1%	Very decent
2	Main trial	90,5%	Very decent
3	Operational Trial	93,8%	Very decent

4.2. Discussion

In the development of this learning media, one of them is an effort to make mathematics something fun. In this case, the

researcher developed a learning media that adapted the technique of solving multiplication operations for elementary school students by using a line of mathematics which was presented in the form of interactive learning media accompanied by a simulation with a line of mathematics.

The results of this study are in the form of learning media that make abstract mathematics material more concrete for students to feel. The difficulties faced by students can make it difficult or even wrong in counting, so that in this learning media there are several simulations of multiplying units by tens and vice versa. This is to insert the nature of the multiplication operation in solving multiplication problems. From the results of this development, the results obtained from media, material, and language experts who provide a good feasibility assessment and are very feasible for this media to be used as an elementary multiplication learning tool. Meanwhile, the results of the trial of the media to users, namely students and teachers, also showed positive results and supported the results of expert assessments, namely that this media was included in the very suitable category for use.

5. Conclusion

The feasibility of interactive media for multiplication material using the linematics technique for grade 3 elementary school is based on the results of the assessment from experts, namely material experts get 65% with proper criteria, media experts get 92.5% with very decent criteria, and linguists get 95% with very decent criteria so that the media can be tested at a later stage. The feasibility of interactive media material multiplication with the linematics technique for grade 3 elementary school based on the results of the assessment on the last test, namely a field test conducted on 1 teacher and one class of grade 3 students at SD Negeri Kuripan 01 obtained an assessment from the teacher of 97.5% with very decent criteria and students obtained 93.8% with very decent criteria. This shows that the developed media can be used in independent learning activities or accompanied by teachers.

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