DOMI KALI: Elementary school multiplication learning media

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Abstract. The purpose of this study is 1) to develop DOMI KALI media, 2) to describe the feasibility of the DOMI KALI media, 3) to describe the practicality of the DOMI KALI media. The method used is adapted from the ADDIE model with four stages, namely: analysis, design, development and implementation. The subjects of the trial were the third grade students of Sumbersari Elementary School 2. The instruments of data collection used validation sheets, questionnaires, unstructured interviews. The results showed that the DOMI KALI media is feasible to use. It obtained a percentage of 90.69% of the experts so that it was included in the feasible category. DOMI KALI is right to understand multiplication and more pleasant learning atmosphere. It is suggested to the teacher to use the DOMI KALI Media as a tool in learning activities so that the multiplication counting operation material is more fun.

1. Introduction

One of the thematic contents that is integrated in the 2013 curriculum, which is the latest curriculum in Indonesia, learning is a mathematical content. The content of mathematics is the content of the 2013 curriculum that must be taught to students at the elementary level. Mathematics is not just a collection of numbers, symbols, and formulas that are not related to the real world but mathematics develops and starts from the real world [1-3]. Active mathematics learning makes students gain an understanding of correct mathematical concepts and the ability to solve problems effectively [4]. Students consider mathematics learning boring and scary because the teacher demands students to think abstractly.

One of the subject matters in mathematical content that is difficult to understand is multiplication [5]. Multiplication is one of the topics in mathematical content [6,7]. This multiplication is very important in the learning process because of its many applications in daily life. The basic concept of multiplication is a recurrent addition [8,9]. Multiplication will be easily understood by students if they use media that facilitate students' understanding of the multiplication itself. In addition to using media, multiplication concept learning can be through story questions equipped with images to achieve fun and meaningful learning for students.

Learning media is a tool in learning activities [10]. Muhsetyo said that the media in mathematics learning is a complementary learning which in its use has a purpose so that the material delivered is easily understood by students. learning media is anything that can convey a message in the form of learning material [11].
Based on observations conducted by researchers on third grade students in Sumber Sari 2 Elementary School Malang, Indonesia, the multiplication learning process is still limited to memorizing multiplication without the existence of media-supported learning. This causes students to be slow to learn multiplication. In addition, multiplication learning only uses blackboard as its media, so learning is less attractive for students, because basically elementary school age students are very happy with fun and enjoyable activities and step-by-step learning methods [12]. The use of multiplication learning media is not appropriate, this has an impact on the low skill in solving problems of multiplication counting operations even for numbers 1-10. This is in line with the opinion of a third-grade teacher that indeed in mathematics learning activities, especially multiplication counting operations require media to assist teachers in conveying information.

These problems were examined by providing alternative problem solving in the form of DOMI KALI (domino multiplication) media development as a multiplication counting learning media. Domino multiplication media is a learning media that presents a method of counting using a card consisting of four sides of a triangle, namely two sides containing multiplication numbers and two other sides containing multiplication results, but the four sides have different colors.

Multiplication media has many choices, one of which is card game media. Card games especially domino card games can be used to involve students in various concepts such as counting operations, adding, multiplying, dividing, and recognizing coordinates [12]. Card games in the general mathematics learning process were applied to schools in Indonesia but in the form of modified cards and game rules, and two of them were known as mathematical dominoes (domats) and domi numbers. Research conducted by Sidarta and Yunianta proves that Domino Card media is valid, effective, and practical use as a means of self-learning exercises for students in Trigonometry courses [13].

Based on the explanation above, the objectives of this study include 1) to develop DOMI KALI media on multiplication learning. 2) to find out the feasibility of DOMI KALI media in multiplication learning. 3) to find out the practicality of using DOMI KALI media in multiplication learning.

2. Method

This study uses a type of development research that adapts the ADDIE development model. Stages that must be done by researchers include analysis, design, development, and implementation. According to Ollerton the stages in the ADDIE development model can be illustrated in figure 1 as follows [14]:

- In the analysis phase there are three things that must be considered, namely analysing the curriculum used by the school, analysing student characteristics, and analysing media use.
- The design phase includes determining learning material, media design, evaluation, learning resources and preparation of media assessment instruments for the validator. Media design illustrated in figure 2
- The development phase includes producing media according to the design and revising the media according to the advice of material experts and media experts.
The implementation phase includes conducting trials to find out the achievements of the media designed for teachers and students.

The DOMI KALI media development uses three semesters one grade multiplication operating material. In the fourth theme material sub-theme of three learning six. This DOMI KALI media was created to help the learning process to be more meaningful and teach understanding and the concept of basic multiplication operations. The initial product development that has been made must go through the validation stage by involving media experts and material experts. The purpose of the validation test is to find out the shortcomings of the DOMI KALI media as a guideline for improvement. Products that go through the validation and valid stages, the media is feasible and ready to be tested to the classroom teacher as a potential user.

The product trial was carried out through a limited field test by giving a questionnaire to 19 third grade students of Sumbersari Elementary School 2. Tests for class III teachers were carried out first before limited field testing until the media was declared good for students. The subject of testing to media experts is carried out on lecturers who are experts in the field of media and applications. The subject of the trial of material experts was carried out to lecturers who taught elementary mathematics. The prospective test subjects were class III teachers, while students were taken 19 people at Sumbersari Elementary School 2. The study was conducted Thursday, January 31, 2019 in the second semester of 2018/2019.

The instruments of data collection include validation sheets, questionnaires, and interviews. A validation sheet is used to determine the feasibility of the media. Questionnaire is used to determine the response of students after using DOMI KALI. Interviews conducted by researchers are unstructured interviews to find out teacher and student responses.

3. Results and discussion

3.1. Results

The media developed by researchers have practical ways to help students understand the content of the material. This is done because some students still do not master the basic multiplication operations 1-10. The making of media by researchers is designed to be easier, more interesting and fun containing multiplication numbers and their results, and equipped with usage rules. The researcher also provided activity sheets in the form of multiplication questions to be done by students. This activity sheet is programmed to help students find multiplication numbers and their results.

In the second stage, researchers conducted multiplication elimination which will be included in the DOMI KALI media. The following stages of multiplication elimination will be included: a) multiplication operations that are not listed are multiplication operations for numbers multiplied by 1 and 10; b) there are several multiplied numbers of 1 and 10 listed, this is to introduce students to multiplication 1 and 10; c) multiplication 1 and 10 are easy to apply because all numbers are multiplied by 1 then the result is the number itself. While the multiplication of 10 if multiplied by a number, the result is the number itself, but behind that number is added the number 0.

The third stage is the researcher making the concept of the domino card that will be used. In this stage material and color selection is carried out in the DOMI KALI media. The fourth stage of the researcher composes numbers and multiplication results from the results of elimination on paper to facilitate researchers in designing media. The fifth stage is the researcher designing the DOMI KALI media in Corel Draw X4 software.

The next stage the researcher makes a research instrument to test the product. The purpose of product testing is done to determine the quality of learning media. The results of media testing can be seen in table 3 below:
Table 1. Analysis of validation, teacher assessment, and limited trial results.

| Aspect | Media expert validation | Material expert validation | Assessment of prospective users (teachers) | Student response assessment |
|--------|-------------------------|----------------------------|-------------------------------------------|----------------------------|
| Media Display | 93.75% | 100% | 100% | 96.49% |
| Instructions | 87.5% | - | 87.5% | - |
| Content | 100% | - | - | - |
| language | 75% | - | 75% | - |
| Use | 100% | - | 87.5% | 94.74% |
| learning instructional component and system | - | 100% | 75% | - |
| Material | - | 87.5% | 75% | - |
| Concepts | - | 87.5% | 75% | - |
| Average | 91.25% | 93.75% | 82.14% | 95.61% |
| Total average | 90.69% |

Based on Table 1, the results of the assessment from media experts, material experts, teachers, and student responses have been presented. Evaluation from media experts was assessed from 5 aspects, namely the aspect of media display, instructions, content, language, and usage which received a percentage of 91.25% with a decent category. This means that the DOMI KALI media is feasible to use. Assessment of material experts was assessed from 4 aspects, namely aspects of media display, components and instructional systems, content of the material and understanding of concepts that received a percentage of 93.75% with appropriate categories. This means that the DOMI KALI media is feasible to be used in the learning process. Assessment of prospective users (teachers) was assessed from 7 aspects, namely aspects of media appearance, instructions, language, usage, components and instructional systems, content of the material and conceptual understanding of 82.14% with very good categories. Assessment of student response results when field tests were limited to 19 students assessed from 2 aspects, namely the appearance aspect of the media and the use of getting a percentage of 95.61% with very good categories. Based on the above assessment, it is known that the DOMI KALI media is very good to use when learning multiplication counting operations, especially basic multiplication 1-10.

3.2. Discussion

3.2.1. Media development. DOMI KALI media development through 2 stages according to the stages in the ADDIE model, namely the analysis and design stages. The analysis phase includes curriculum analysis, student characteristics, and media analysis and utilization. Learning has thematically applied, but researchers only focus on one learning content, namely mathematics with class III multiplication operations operating material 1. Analysis of student characteristics includes: students have different learning methods that result in differences in understanding, students have difficulty memorizing material but have not understood the concept multiplication material, students lack enthusiasm in the learning process because of the lack of learning media that help convey the material. Media analysis and its use in learning, the media used are still simple using a blackboard, not yet using learning media that attract students' attention and the media used is less relevant to the material to be delivered. Each student has different motivations and attitudes about learning, and responses that different for certain classroom environments and learning practices [16].

The design phase carried out by researchers is designing media that will be developed in multiplication counting operations. The media developed by researchers is easier and more fun to help students understand the content of the material. The researcher also eliminated several multiplication numbers 1 and 10 and
made the concept of a domino card that would be used in Corel Draw X4 software. At this stage, researchers also make research instruments including questionnaires validating media experts, material experts, teacher assessments, and responses of students and researchers to develop RPP as implementation guidelines. This is in line with research by Amir and Wardana, who developed open ended fraction domino media [17]. The results of media development produce good quality media products to increase the diversity of learning media and help teachers provide material in the learning process.

3.2.2. Media feasibility. The DOMI KALI media can be known to be feasible through the development stage according to the stages in the ADDIE model. The results of the development that has been done, the researcher conducted a validation to media experts and material experts to find out the feasibility of the media. Based on the results of the DOMI KALI media assessment by two validators, the DOMI KALI media received a percentage of 92.5% with a decent category, so that the media was feasible to be tested on students. Other researchers have also proven the Validity test done by 2 validators, there are media experts and material experts. It has been obtained by the media feasibility result of 98.71% with a very decent category and the result of material feasibility of 92.5% with very decent categories [13].

3.2.3. Practicality of the media. The practicality of the DOMI KALI Media can be known through the implementation stage in accordance with the fourth phase of the ADDIE development model. The results of practicality assessment are obtained from prospective users (teachers) and students. Teacher assessment activities were carried out before implementation for class III students in Sumbersari 2 SDN as many as 19 people. Assessment by teachers gets a percentage of 82.14%, the category is very good so that the media can be implemented to students. Assessment of student responses gets a percentage of 95.61% in a very good category, so the media is said to be practical in its use. This is in line with Rendana's research which developed science learning media in the form of dominos students by getting excellent qualifications [18]. Assessments carried out with limited field testing received a percentage of 91.59%, while the assessment of the wider field trial received a percentage of 92.01%. The assessment shows that media is good to implement and learning becomes more fun [19,20]. Other researchers also proved that media can increase motivation and can increase students' motivation and offer a more pleasant perception for students during the learning process by developing robots to design RLCs [21].

4. Conclusion
Based on the results of DOMI KALI’s media research, it obtained a percentage of 90.69% of the experts so that it was included in the feasible category. DOMI KALI is right to understand multiplication and more pleasant learning atmosphere. It is suggested to the teacher to use the DOMI KALI Media as a tool in learning activities so that the multiplication counting operation material is more fun.

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