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Development of a Multiplication Learning Media for Primary School Mathematics using Multiple Math Card

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Abstract: This study aims to develop MATHCA (Multiple Math Card) learning media in multiplication material of elementary school grade III. The background of this research is that there are no learning media in the form of cards that have been developed specifically by combining a learning system with a game in the form of cards. The method used in the Research and Development (R&D) uses the method Analysis, Design, Development, Implementation, Evaluation (ADDIE) model. The subjects in the study were third-grade students of SD Negeri 1 Cisantana, Cigugur district, Kuningan Regency. The result showed that media MATHCA was very valid base on the calculation result of media experts, with an average score of 98%, material experts with an average score of 92%, and linguists with an average score of 92%. The result of the practicality test of teachers obtained an average score of 90%, and the results of trials conducted in small groups obtained 96,6%, and in large group, trials obtained a score of 91,1%, this indicates a high level of practicality category in both groups. Thus, it can be concluded that MATHCA learning media that was developed using the ADDIE model is valid and practical to be applied to mathematics learning.

Keywords: development model, learning media, ADDIE, multiple math card.

Abstrak: *Penelitian ini bertujuan untuk mengembangkan MATHCA (Multiple Math Card) sebuah media pembelajaran materi perkalian untuk kelas III Sekolah Dasar. Latar belakang penelitian ini adalah belum ada media pembelajaran berbasis kartu yang dikembangkan secara khusus dengan menggabungkan sistem pembelajaran dengan permainan berbasis kartu. Metode yang digunakan yaitu Research and Development (R&D) dengan menggunakan model Analisis, Desain, Developmen, Implementasi dan Evaluasi (ADDIE). Subjek pada penelitian adalah siswa kelas III SD Negeri 1 Cisantana, Kecamatan Cigugur, Kabupaten Kuningan. Hasil penelitian menunjukkan bahwa media MATHCA sangat valid berdasarkan perhitungan ahli media dengan skor rata-rata 98%, ahli materi dengan skor rata-rata 92% dan ahli bahasa dengan skor rata-rata 92%. Hasil uji kepraktisan guru mencapai 90%, dan hasil uji coba yang dilakukan pada kelompok kecil memperoleh 96,6% serta pada uji coba kelompok besar memperoleh skor 96,1 %. Hal ini menunjukkan ketegori tingkat kepraktisan tinggi pada kedua kelompok. Maka dapat disimpulkan bahwa media pembelajaran MATCHA yang dikembangkan menggunakan model ADDIE valid dan praktis untuk pembelajaran matematika.*

Kata kunci: *model pengembangan, media pembelajaran, ADDIE, multiple math card.*

▪ INTRODUCTION

Education is one of the efforts to develop and improve quality human resources. Education is also an attempt to develop students' potential capabilities to become a human with characters, knowledge, skillful, creative, independent and high competitiveness to encounter global competition by mastering technological advancement (Marisa et al., 2020; Thahir et al., 2020). The learning process is a very important factor. In the learning process in it to produce goods and quality educational conditions, teachers are required to be able to manage education that can provide

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stimulation to students so that they are willing and able to explore online and offline education (Iswan, et all., 2022).

According to Article 20 of Law number 14 of 2005 concerning teachers and lecturers in the second point. It is emphasized that in carrying out their professional duties, teachers are obliged to continuously improve and develop their academic qualifications and competencies in line with the development of science, technology, and the arts. Teacher as a facilitator is encouraged to mind the supporting tools in the teaching process by following the progression of information and communication technology nowadays so that they can provide interesting tools that ease the students in understanding the learning materials (Duengo et al., 2020; Hamid, 2020). The supporting tools used in the teaching and learning is called learning media (Majid, 2020). Permen No. 22 of 2006, Mathematics should be given to all students from elementary school to equip students with logical, analytical, systematic, critical, and creative thinking skills, as well as the ability to work together. The basis of this mathematics learning is that students first understand about addition which is then used to proceed to the next learning about multiplication.

The content of mathematics is the content of the 2013 curriculum that must be taught to students at the elementary level. The Head of the Regional XIII West Java Education Office Branch Office (KCD) Prabowo (2021), said that based on the survey data, it turned out that the average Mathematics final exam of students in West Java was still in the 10th rank of all provinces. Markovits, 2011) said that Active mathematics learning makes students gain an understanding of correct mathematical concepts and the ability to solve problems effectively. So, we learn that mathematics learning is still low, there is a need to apply more creative and innovative mathematics learning in formulating strategies so that it is more varied.

One of the subject matters in mathematical content that is difficult to understand is multiplication (Saleh, 2010). 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 (Chen et all., 2019; Smith et all., 2010). 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 (Yuniasih, et all., 2019).

Multiplication media has many choices, one of which is card game media. 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. Students have difficulty connecting one concept to another. Astriani and Iswan, (2020) this is due to a lack of understanding of the material received. Referring to Lestari and Irawati's research, (2020) the teacher provides an interesting learning process to provide a stimulus to students to be more active in paying attention to learning.

The Covid-19 pandemic has an impact on the learning system, namely all educators and students are forced to study online or with Distance Learning (PJJ) (Handayani et al., 2020). mathematics, lack of parental supervision in the learning

process. Elementary school students need supervision during learning, especially in mathematics, because in learning mathematics students must be able to hone their ability to solve problems. From these problems, the alternative that can be done is to play games using teaching aids in the form of cards as learning media, and also supported by the teacher so that the learning system with this card game can be implemented properly.

Students really need a companion in receiving mathematics learning. The role of the game can make students more focused, practice their sportsmanship and also train them to solve problems because there are problems in the game that must be solved quickly and precisely. If games are designed to achieve learning objectives, games can be a source of learning (Sari, 2018:5). The existence of games that are considered disruptive to student learning, makes students forget their other tasks, innovation is needed to change this assumption by establishing cooperation between learning and games that are liked by students. (Kurnia et all., 2021). As a learning medium, games are expected to allow students to spend more time studying.

Games based cards are one of the media that can be used to apply mathematics learning using Multiple Math Cards (MATCHA). Card-based games are one of the media that can be used to apply mathematics learning using Multiple Math Cards (MATCHA). MATHCA is a math smart card designed in the form of a card. MATHCA consists of multiplication of 1 to the multiplication of 10, there are 2 types of cards, namely question cards and answer cards. Usually, the multiplication card media contains numbers, in MATHCA the numbers will be replaced using animal and plant characters based on local wisdom typical of Cisantana village.

▪ METHOD

Participants

In this research, the subject of the research trial were from students grade 3 of Primary School. The existence of this stage is carried out to determine the response of the students to develop learning media using Multiple Math Card. In addition, the object of this research is an integrated Multiple Math Card to help students learning in the classroom. The location of this research is SD N 1 Cisantana, which location in Jalan Cisantana, Kecamatan Cigugur Kabupaten Kuningan West Java.

Research Design and Procedures

The research method used is the Research and Development (R&D) research method. is a research method that produces a product, it can be in the form of modules, models or others, besides that there is also the effectiveness of the products that have been made (Saputro, 2011) . The product here is defined as a product in the form of hardware or software, such as interactive learning models, guidance models and others (Maksum, 2012).

The product produced in this research learning media using Multiple Math Card called MATCHA. This research procedure uses the ADDIE development model, the ADDIE development model is a development model consisting of 5 stages, such as: (1) Analysis, at this stage a needs analysis is carried out in the form of a literacy study from the impact of online learning, then analysis of learning materials, and environmental analysis according to the product to be developed. (2) Design, at this stage is the design stage of the product to be developed. (3) Development, at this stage is the process of

realizing the design that has been designed into a real product. (4) Implementation, at this stage the application of the product that has been developed, in this study the implementation stage was only limited to testing in small groups. (5) Evaluation, at this stage the process is shown to see how the products that have been developed have been successfully made and are suitable for use or not.

Instruments

Data collection techniques used by researchers are (1) Interview, in this study researchers conducted interviews with the headmaster of SDN 1 Cisantana to aim of knowing the problems in classroom. After interview prosess the next step is (2) Observation, Observations were made during the learning activities. The aim is to find out the models and methods used by teachers in learning activities. . Furthermore, the distribution of (3) Questionnaires or questionnaires, The questionnaire used in this study was an expert validation instrument sheet and a questionnaire to determine student responses to the developed learning media.

The data collection instruments in this development research are (1) Interview, In this case, the interview guide only contains the essence of the interview regarding the problems that occur in classroom learning activities. Then, (2) Observation, This observation was conducted to find out about the completeness of facilities and infrastructure, models and methods, the use of media and students' attitudes towards learning carried out in the classroom. The existence of an observation sheet is used by researchers as a reference in developing media that can be used in the learning process (Kristanto, 2018). Furthermore, (3) the instrument validation, which consists of an expert validation instrument sheet and a student response instrument sheet. On the Expert Validation Instrument Sheet, the use of this validation questionnaire is filled out by media experts, material experts which in this questionnaire are closed in nature. The student response questionnaire was used when testing the product being developed.

Data analysis

Data analysis techniques are very important in the scientific method, because with data analysis, we can find out whether the data can be given meaning or meaning that is useful in solving problems from a research (Sugiyono, 2015). The product design that has been developed will be assessed by the validator using a validation instrument. In addition to the validation instrument, the reference used as an assessment of the learning media that has been developed by the researcher is the student response questionnaire instrument, which then the results of the assessment of all aspects will be measured using a Likert scale. The Likert scale is a measurement scale in the form of a number of positive or negative statements about an attitude object (Wagiran, 2013).

In this study, the answers to the validation instrument items were grouped into five choices. Each indicator will be measured and given a score on a scale of 1-5 in accordance with the guidelines for assessing the feasibility of a learning media that has been prepared by the researcher. In addition, each indicator of the student response questionnaire will be given a score of 1-5 scale, namely 5 (strongly agree), 4 (agree), 3 (disagree), 2 (disagree), and 1 (strongly disagree). The results of the average score are converted into an assessment statement, the assessment can be said to be high if the percentage is 67% - 100%, the rating is 34% - 66%, and the assessment is low 0% - 33%.

The data analysis technique in the practicality test of students uses the Guttman scale. The answers to the student response questionnaire using two categories were made in the form of the choice "Yes or No", the point is 1 for Yes, and 0 for No, this was used to make it easier for students to answer questions. The results of the mean scores are converted into a rating statement for the Guttman scale. Rating can be said to be high if the percentage is 67% - 100%, moderate assessment is 34% - 66%, and low assessment is 0% - 33%

▪ RESULT AND DISSCUSSION

The research and development of learning media are carried out at SD Negeri 1 Cisantana which is located at Jl. Raya Cisantana, Cigugur District, Kuningan Regency, West Java. Researchers conducted research at SD Negeri 1 Cisantana due to the lack of learning media in schools, especially mathematics learning media. The results section contains research findings obtained from research data and relates to hypotheses. The steps for developing the ADDIE model have been simplified in the development process, which is described as follows.

Analyze

Analysis of student researchers observed the learning process directly in the classroom for seven days and obtained information from the learning carried out. Researchers get information from observations that teachers always use the lecture method throughout the lesson. Analysis of the curriculum at SD Negeri 1 Cisantana uses the 2013 curriculum. In the 2013 curriculum of teachers as mentors, facilitators, creative and innovative, in learning activities in class students are also required to be active in group discussions and not depend on the teacher. Researchers also analyzed the characteristics of students after using Distance Learning (PJJ) for a long time. Students learn to rely on gadgets to learn, the character of students who like to play, researchers create learning media that students can use to learn while playing.

Design

The MATHCA planning stage is the researcher determines the design of the card back view, card front view, user manual and video guide. Researchers replace numbers on multiplication cards with animal and plant characters. The following is a media design that will be realized into a MATHCA product.

Figure 1. Sample of display card of MATCHA

How to use MATHCA products:

First the teacher divides the students into several groups, one of which consists of 3-4 students. After being divided into groups, the teacher scrambles the question cards and then distributes them to groups of 5-6 question cards. second the teacher provides a card containing correct and incorrect answers, the answer cards are placed in front according to the number of groups. After that the teacher prepares all the cards. The game is ready to start, the teacher will give 5 minutes for students to count. After that, students will be given 1 minute to look for answers that the teacher puts in front of the class. Third the group that succeeds in calculating the fastest will get the highest point and the last group that succeeds in working gets the lowest point. On the back of the card, there is also a barcode that can be scanned to view videos of using MATHCA products.

Development

In making MATHCA cards, researchers determine the characters of animals and plants that will be used for the front display of the card. After being asked to be valid and revised according to suggestions from experts, the card was developed into a product, namely Multiple Math Card.

Figure 2. MATHCA back card display

Figure 3. Product front view

Implementation

The implementation phase is carried out at SD Negeri 1 Cisantana. In collecting trial data, they are two-stage trials with a small group trial by 5 students and a large group trial by 15 students. The product conducted a trial in class III and randomly selected students in one group.

Evaluation

The final stage in the development of MATHCA media is to make improvements based on suggestions from experts and users. This evaluation stage is carried out to improve the MATHCA media. Based on the results of expert validation, teacher practicality trials, and group trials, it can be said that the media can be used with a high level of practicality.

Figure 4. Final product of matcha

In this part, test product validity with experts before testing the product. Expert validation that the researcher uses are media expert validation, material expert validation and linguistic expert validation. The results of the assessment of media experts 98%, material experts 92% and results from linguists 92% included in the very valid category. The results of filling out the questionnaire on the practicality test of the teacher got an average score of 91.6% with the category of high practicality. After the research expert test and teacher practicality test was carried out, then the students were tested, namely trials in small groups and large groups.

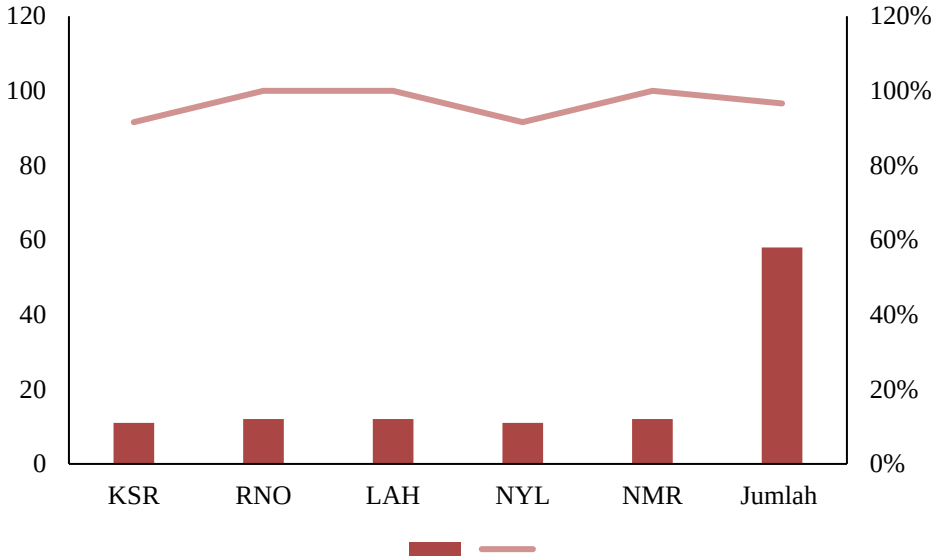

Figure. 5. The result of students small group trial

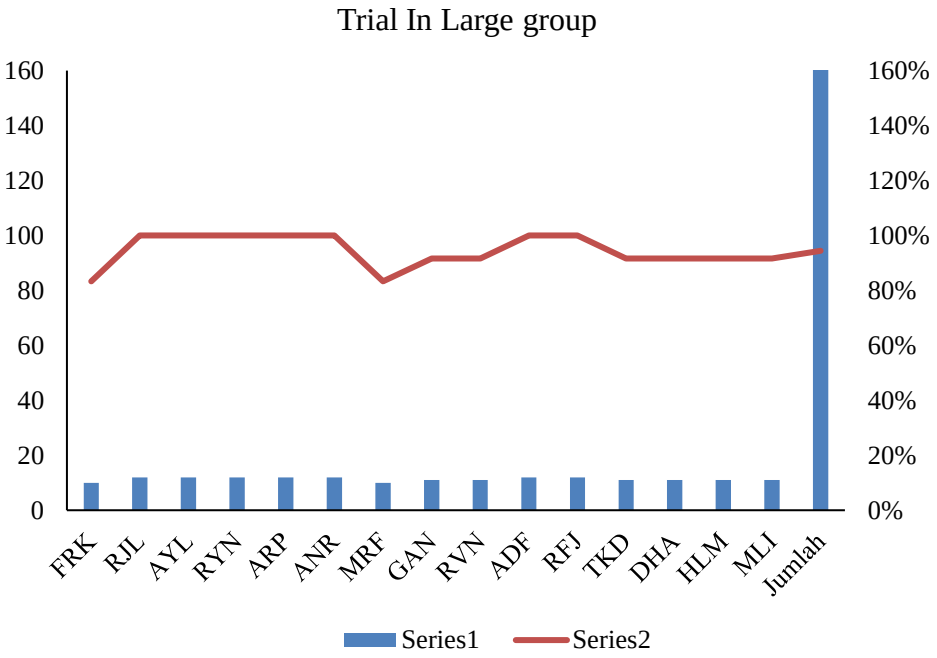

Figure. 6. The result of students in large group trial

Based on the Figure 5 and Figure 6 above, the results of the small group trial questionnaire as a whole get an average score of 96.6% in the high practicality category, and the large group trial got an average score of 94.4% in the high practicality category too. So, this shows that the two products developed have good results with high practicality categories.

▪ CONCLUSION

The results of research and development can be concluded that the development of MATHCA media has gone through several stages, such as: analysis, design, development, implementation, and evaluation. The results of the assessment of the media expert test are 98% included in the very valid category. Material experts, namely 92%, are included in the very valid category. language experts, namely 92% included in the very valid category. The teacher's practicality test got an average score of 91,6% with a very valid category. Small group trials got an average score of 96.6% with high practicality category and large group trials got an average score of 94.4% with high practicality category then Multiple Math Card (MATHCA) media is valid and practical can be used in learning mathematics elementary school.

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