

DEVELOPMENT OF MULTIMEDIA LEARNING SOLUTION MATHEMATICS (MUJAMATCAH) AS A LEARNING MEDIA FOR GRADE IV PRIVATE SCHOOL STUDENTS

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Abstract

The development of technology is currently very fast and influences various fields, one of which is education. for example the use of media in learning, such as the use of multimedia learning. In addition, this study also aims to improve students' understanding of fraction material for fourth grade elementary school students. This is the background of this research in multimedia learning mathematics development. The purpose of this study was to develop multimedia learning mathematics on fractions for fourth grade elementary school students. This research is a Research and Development (RnD) type of research according to Sugiyono which is limited to only seven stages of research. The stages include, potentials and problems, data collection, product design, design validation, design revision, product testing, and product revision. The result of this research is multimedia learning of fraction mathematics (Mujamatcah) for fourth grade elementary school students with the aim of increasing students' understanding. Where to get the following results, for the validation of material experts 94% (very feasible), validation of media and multimedia experts for learning 87% (feasible), and validation of language 89% (feasible). The results obtained from the student readability test obtained data of 96% (very feasible) and for teacher readability of 91% (very feasible).

Keywords: Development, Learning Multimedia, Fractions

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1. INTRODUCTION

The development of information technology encourages changes in various fields of life. One example of change is in the field of education. Changes in education, for example, are the use of technology-based learning media, such as the use of multimedia learning. This is also conveyed by Wandah (2007: 1) that in the realm of education in schools there has been a change

and a new paradigm shift, where currently the exchange of information, especially knowledge, is easier to obtain with the current technology. With the existence of such technology there are no boundaries to access scientific information. Thus, this also affects the learning process in schools. Teachers must be more innovative by taking advantage of current technological developments, so as to achieve the desired learning objectives.

In relation to achieving learning objectives, the role of learning media here is very important to achieve these learning objectives. As stated by Munir (2012: 7) that the use of learning media is expected to be able to form stimuli that can be responded to by students, so that learning objectives can be achieved. In addition to forming a stimulus Umar (2014: 136-137) also said that learning media can help teachers visualize the material to be conveyed to students. Especially in learning mathematics.

In learning mathematics, elementary school students are, of course, very different from high class students. Where elementary school students still need concrete objects to be able to visualize the information they get (Heruman, 2010: 1). Like Piaget's theory that elementary school students aged 7-12 years are still in the concrete operational phase, where they still need concrete objects to be able to understand information. So that we need learning media in mathematics learning, where mathematics is an abstract learning (Sujono, 2009: 99).

Based on the results of observations made at 3 elementary schools in the city of Blitar, there were problems with students' attitudes and understanding. When learning, students tend to be passive, especially when learning mathematics takes place. Students have difficulty changing between fraction types. This is evidenced by the results of the student needs analysis questionnaire, that 88% of the 78 students did not understand fractions well.

Apart from the problem of student understanding, the use of learning media is also very lacking. Based on the teacher and student interviews, it was found that when learning mathematics, the teacher's fraction material only used existing books, blackboards, and origami paper to show ordinary fractions. Whereas in the basic competency, KD 3.1 explains fractions equal to images and concrete models, KD 3.2 describes various forms of fractions (ordinary, mixed, decimal, and percent). However, in the media it is only for ordinary fractions. Even though the school has provided adequate facilities and infrastructure for media development .

The existing facilities and infrastructure at the school can also support the learning process, so that the media used by the teacher can be innovative. For example, in the library there is a TV that can be used to view videos. In addition to TV, there is also an LCD that can help teachers make learning media, such as multimedia learning. In the student needs analysis questionnaire stated that 89% of 78 students enjoyed using computer-based media. So that the

researchers conducted research on the development of multimedia learning of fraction mathematics (Mjamatcah) for fourth grade elementary school students.

The development of multimedia learning looks at previous research by Santi Ratna Dewi and Haryanto with the final results of the evaluation by material experts in the "Very Good" category with a mean score of 3.56. The final result of the evaluation by media experts is in the "Good" category with a mean score of 3.28. The final results of the evaluation by students are included in the "Good" category with a mean score of 3.36, so this research is said to be feasible (Dewi, et al. 2018: 20). Furthermore, the research was conducted by Lailatul Fitri, Arta Uly Siahaan, and Fandy Neta with the results of the media expert validation test getting a percentage of 89.7% in the very feasible category and the material expert validation test getting a percentage of 94.81% in the very feasible category (Fitri, L, et al. 2019:105).

Based on the description above, the researcher will develop multimedia learning of fraction mathematics (Mujamatcah) for grade IV elementary school students

2. RESEARCH METHODS

2.1. Type of Research

This type of research is the Sugiyono model of Research and Development (RnD) which is limited to seven stages. The product that the researchers developed was multimedia learning of fraction mathematics for grade IV elementary school students

2.2. Time and Place of Research

The research was conducted in July 2020 on elementary school students.

Research subject

The subjects of this study were 5 grade students of elementary school and 5 elementary school teachers.

2.3. Research Procedures

The procedure carried out in this study includes seven stages, namely potentials and problems, data collection, product design, design validation, design revision, product testing, and product revision.

2.4. D. Data Collection Instruments

The instrument used in this study was to use a validation questionnaire for material experts, media and multimedia experts, and linguists, as well as a student and teacher readability questionnaire during the readability trial.

2.5. E. Data Analysis Techniques

The data analysis technique in this research is to use qualitative data analysis and quantitative data. For qualitative data obtained from an open questionnaire assessment containing criticism and suggestions or input from the teacher after the learning process using

Mujamatcah. Meanwhile, quantitative data were obtained from the results of a closed questionnaire given to teachers and students. With calculations using the Likert scale. The following is the formula used to calculate quantitative data.

$$P = (\sum x) / (\sum xt) \times 100\%$$

Information:

P = eligibility

$\sum x$ = number of selected answers

$\sum xt$ = the highest number of answers

Tabel 1. Student Questionnaire Assessment Indicators

No	criteria	Positive	Negative
1	yes	1	0
2	No	0	1

Tabel 2. Qualification of the Media Readability Level of Student Response Results

Level of achievement	Level of Appropriateness
90 – 100%	Very Appropriate
75 – 89%	Appropriate
65 – 74%	Appropriate Enough
55 – 64%	Less Appropriate
0 – 54%	Not Appropriate

Tabel 3. Score Indicators Students' and Teachers' Questionnaire Response

No	criteria	Positive	Negative
1	Very good	5	1
2	Good	4	2
3	Enough	3	3
4	Less	2	4
5	Very Less	1	5

Tabel 4. Qualification Based on Average Representation

Achievement level	Validity Level	Information
90 – 100%	Very Eligible	No Need Revisison
75 – 89%	Eligible	No Need Revisison

65 – 74%	Eligible enough	Revisison
55 – 64%	Less Eligible	Revisison
0 – 54%	Not Eligible	Revisison

3. RESULTS AND DISCUSSION

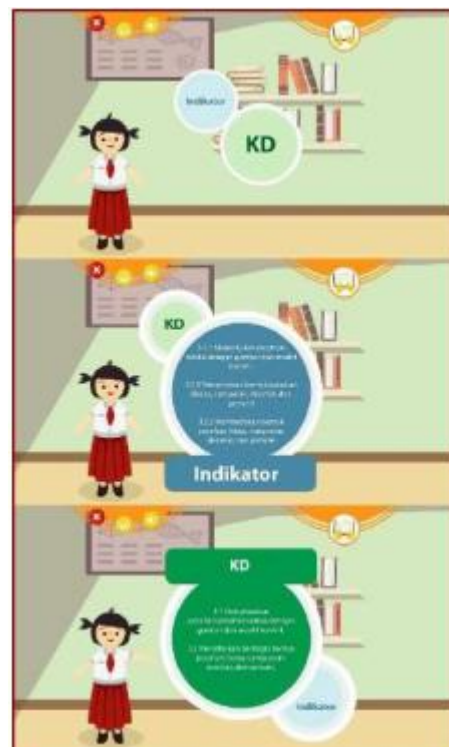
The development of Mujamatcah multimedia learning developed by researchers has gone through the validation and revision stages by nine validators consisting of three material experts, three instructional media experts and three linguists. The material expert consists of two expert lecturers and one elementary school teacher. The instructional media experts consist of two expert lecturers and one elementary school teacher. The linguist consists of three expert lecturers. The results of the research's development are multimedia learning Mujamatcah. Mujamtcah multimedia learning is in the form of softfile, by operating using a PC with four main buttons in the application, namely the profile button and instructions for use, KD and indicators, materials, and quizzes. Below is a picture of the main button design of the application.



Gambar 1. Beginning template of Mujamatcah



Gambar 3. Material display



Picture 2. Profile KD and Indicators



Picture 4. Profile Template



Picture5. Puzzle and Quizz

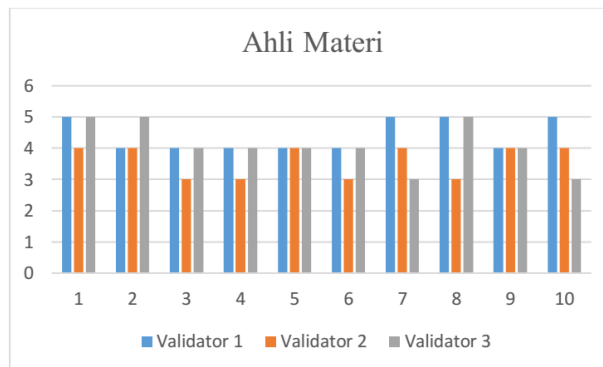
The results of the development of this Mujamatcah are in accordance with input from 9 experts and also the results of trials conducted on students and teachers. For material experts, the following results were obtained. The results of the assessment of 3 material experts obtained 94% data. From the criteria 90-100% are categorized as very feasible, 75-89% are categorized as feasible, 65-74% are categorized as quite feasible, 55-64% are categorized as less feasible, and 0-54% are categorized as not feasible. Based on the eligibility criteria, the value obtained in the material expert validator is in the range 75% -89%, so it is included in the valid and feasible category to be used. The content of the material and the composition of the material have received good marks from the experts with several revisions. The following is a table from material experts.

Nomor Soal	Validator 1	Validator 2	Validator 3	Total Skor
1	5	4	5	15
2	4	4	5	15
3	4	3	4	14
4	4	3	4	15

5	4	4	4	17
6	4	3	4	17
7	5	4	3	19
8	5	3	5	21
9	4	4	5	21
10	5	4	3	22
Total skor				121
Skor Kriteria				150
Presentase				81%

Media Expert Validation Table

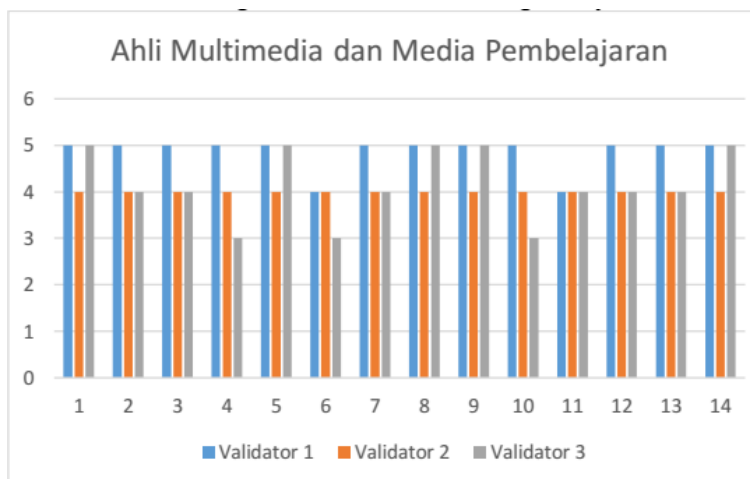
The following is for a diagram of the results of the material expert's assessment



The results of the assessment of 3 media and multimedia learning experts obtained data of 87%. From the criteria 90-100% is categorized as very feasible, 75-89% is categorized as feasible, 65-74% is categorized as quite feasible, 55-64% is categorized as less feasible, and 0-54% is categorized as not feasible. Based on the eligibility criteria, the value obtained in the material expert validator is in the range 75% -89%, so it is included in the valid and feasible category to be used. The aspects assessed by media and multimedia experts are appearance and effectiveness in use. From these two aspects, it got good scores with several previous revisions. From this aspect, it includes the existing criteria. The feasibility of this media has also met the media criteria described by Darmawan (2012: 55), among others, is that it contains representative material in the form of visual, audio and audiovisual, has an attractive appearance and good aesthetics in terms of language, color and language of resolution. objects, have various ways of providing feedback and reinforcement of student responses, and can be used jointly or individually. The following is a table for the assessment of instructional media and multimedia experts

Nomor Soal	Validator 1	Validator 2	Validator 3	Total Skor
1	5	4	5	14
2	5	4	4	12
3	5	4	4	13
4	5	4	3	12
5	5	4	5	13
6	4	4	3	13
7	5	4	4	12
8	5	4	5	12
9	5	4	5	12
10	5	4	4	12
11	4	4	4	12
12	5	4	4	13
13	5	4	4	13
14	5	4	5	14
Total skor				182
Skor Kriteria				210
Presentase				83,3%

This is the diagram the result of the score given by multimedia expert and learning media expert.

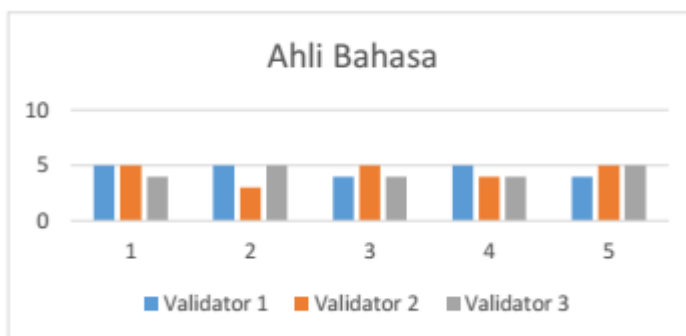


The results of the assessment of 3 media expert validators obtained a percentage of 89%. From the criteria 90-100% are categorized as very feasible, 75-89% are categorized as feasible, 65-74% are categorized as quite feasible, 55-64% are categorized as less feasible, and 0-54% are categorized as not feasible. Based on the eligibility criteria, the value obtained in the material expert validator is in the range 75% -89%, so it is included in the valid and feasible

category to be used. From the aspects assessed by material experts, namely the use of language in the application according to the level of student development. From the assessment and input from experts, it was obtained the feasibility of the language for this Mujamatcah application. The following is a table of linguists' ratings.

Nomor Soal	Validator 1	Validator 2	Validator 3	Total Skor
1	5	5	4	15
2	5	3	5	13
3	4	5	4	13
4	5	4	4	13
5	4	5	5	14
Total skor				67
Skor Kriteria				75
Presentase				89%

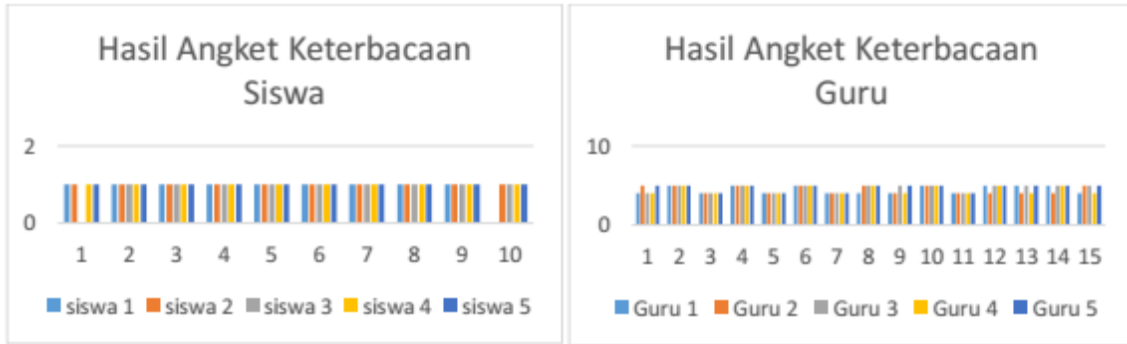
This is the result score from Language Validator.



Learning media that have been validated and declared valid, the next step is product testing. The trial was limited to students and teachers to determine the readability of students and teachers after using Mujamatcah multimedia learning. After the test is complete, students and teachers are given a readability questionnaire to answer.

The score for the student's readability questionnaire was 48 so that the percentage value was 96%. This value falls within the range of 90-100% so that it is judged from the readability level that Mujamatcah multimedia learning is very feasible. The aspects assessed are media display, material and language.

The trial was also carried out on 5 elementary school teachers to determine the readability of the teacher after using the Mujamatcah multimedia learning. The aspects of the assessment are appearance, media, and language. The following is a diagram of the student and teacher readability questionnaire..



Based on the quality criteria of learning media that have been fulfilled, the Mujamatcah multimedia learning in mathematics learning for grade IV SD has met the valid and feasible criteria. Thus, the Mujamatcah learning multimedia that has been developed can be used as a medium for learning mathematics in grade IV SD with fractions as material.

4. CONCLUSION

Based on the research and development that has been done, it can be concluded as follows:

- a. This Mujamatcah multimedia learning has been validated by material experts, media experts and linguists and has been tested on fifth grade elementary school students and fourth grade elementary school teachers, with the final data obtained by 81% for material experts, 87% for media experts, and 89% for linguists. Based on the results of the validation test by 3 expert fields, it is known that the Mujamatcah learning multimedia developed gets an average percentage of 86% with the category of feasible use.
- b. According to the data from the results of the student and teacher readability trials, Mujamatcah's multimedia learning was considered very feasible with a percentage of 96% of the student readability questionnaire data and 91% of the teacher readability questionnaire data.
- c. Based on the results of expert validation and legibility testing, it is known that supplement book teaching materials have several advantages and disadvantages, including the following:
 1. The advantages of this Mujamatcah multimedia learning are:
 - a. The appearance of learning media is attractive because it is designed in full colors, images and animation so that it is in accordance with the characteristics of elementary school students.
 - b. The material presented is complete and easy to understand.
 - c. The quizzes are shown to be attractive to students at a level level.

- d. There is an animation about the application of fractions to students' daily lives, so that students can apply the learning that has been obtained in their daily lives.
 - e. Mujaamatcah multimedia learning is equipped with quizzes that can train students to think systematically because quizzes have a level of completion.
 - f. Mujaamatcah multimedia learning can also help teachers in delivering Fractions subject matter.
2. Weaknesses of this Mujaamatcah multimedia learning are:
 - a. There is no evaluation in the Mujaamatcah multimedia learning
 - b. It is only limited to fractions, so it can only be used in Mathematics learning..

5. SUGGESTIONS

For further researchers, it is suggested to be able to develop Mujaamatcah multimedia learning with different materials, so that it can enrich multimedia learning in Indonesia to be integrated with students and educators.

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