Fractional *Lempeng* Media Development for IV Class Students

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Abstract. Fractions are one of the materials that are prone to misunderstandings because most students do not understand the concept of fractions. Lack of students' understanding of the concept of fractions is due to the not maximizing the making of learning media which is designed simply and with makeshift materials. As the results of observations, it was found that the learning media for fraction pizza puzzles made by students were only limited to origami paper which was cut into 8 parts and then pasted on cardboard covered with cardboard paper. So that the media can only display one concept of ordinary fraction examples with the same denominator and cannot be modified for other denominator fractions. From the statement of the homeroom teacher for IV Class, it is known that there is no use of learning media for fraction of material in the class. The purpose of this study was to determine the feasibility of Fractional *Lempeng* Media for IV Class students in terms of validity, practicability, and effectiveness. The type of research conducted is development research (Research & Development/R&D). The development model used is the ADDIE model with 5 stages, namely Analyze, Design, Development, Implementation, and Evaluation. The test subjects in this study were students of SDN Karang Mekar 4 IV Class with a total of 27 students. Data collection instruments used were validation sheets, student response questionnaires, and evaluation tests. The data analysis technique used is the average score and percentage. This research produces a product, namely Fractional *Lempeng* Media for IV Class students. The results showed that the media developed obtained valid, very practical and effective criteria. So that this Fractional *Lempeng Media* is suitable for use in learning.
Keywords: development, media, fraction *lempeng*

1 Introduction

One of the important branches of science for humans to learn is mathematics. By studying mathematics well, students will gain a good understanding of mathematical concepts and the ability to solve problems effectively. This ability supports the development of modern technology in people's lives. As Mufidah stated, mathematics is a universal science that is useful for human life, is the foundation for the development of modern technology, plays a role in various sciences, and advances human thought (Mufidah et al., 2022).

Based on the Minister of National Education Regulation number 22 in year of 2006, the aim of learning mathematics is for students to have the ability to understand mathematical concepts, explain the relationship between concepts or algorithms, flexibly, accurately, efficiently and precisely in solving problems (Rahayu, 2018). The objectives of learning mathematics can be achieved through a meaningful learning process, in this case one of which is using learning aids, namely interesting learning media that can explain the material properly.

Media is a tool used by teachers to convey messages in the form of learning to students and can make it easier for teachers to convey learning (Wulandari & Yuliandari, 2023). Learning media can be described as a tool that helps students start the learning process. Sanjaya stated that learning media includes hardware that can convey messages and software that contains messages (Makki & Aflahah, 2019).

According to Ratnasari (in Wulandari & Yuliandari, 2023) the lack of media use by teachers at the elementary school level in mathematics lessons results in learning being less interesting and the

impression being monotonous because it only conveys the material, especially for fractions. Furthermore, Ratnasari stated that fractions are also one of the materials that are prone to misconceptions because most students do not understand the concept of fractions. The misconception in question is a concept that is not in line with the established scientific concept. It can happen if the teacher does not emphasize understanding the concept of fractions, but only emphasizes how to solve problems. The lack of learning aids and learning media also a factor in students' difficulty in understanding the concept of fractions.

This is in line with the results of observations at SDN Karang Mekar 4, researchers found several learning media created by students that looked damaged at the school. Among them are 2 mathematics learning media, namely fractional pizza puzzles. The media looks very simple and uses simple materials. The media made is limited to origami paper that is cut into 8 parts and then attached to cardboard covered with cardboard. Thus, the media has a drawback, namely that it can only display the concept of ordinary fractions with the same denominator so that it cannot be modified for other denominator fractions.

Based on the statement of the homeroom teacher for IV Class, it is known that in explaining the material on fractions, learning media was not used in the class, which is thought to be the cause. Lack of students' understanding of the concept of fractions. As stated by Pajarwati in (Wulandari & Yuliandari, 2023) that the lack of teacher creativity in creating learning media and the limited use of media also affect students' understanding of the concept of fractions. This statement is in line with the data obtained from the average value of IV Class in the final exercise of the fraction chapter, which is 48.43 with a classical completion percentage of only 21.87%.

Seeing the media conditions as described, it is necessary to develop learning media, especially for the concept of fractions. With appropriate media, it will attract more students' attention, foster students' learning motivation, and improve students' learning outcomes. One effort to make learning media attract students' attention is to design the media using attractive images based on what is in the surrounding environment. One way is to use a picture of "*lempeng pisang*". "*Lempeng pisang*" are a local food of South Kalimantan with a round and flat shape similar to pizza, so it is nicknamed the pizza of the Banjar people. The circular shape of the *lempeng* can be used to explain the concept of fractions.

Based on these problems, the researcher is interested in conducting research and developing appropriate media for fraction material with the title " Fractional *Lempeng* Media Development for IV Class Students ".

2 Methods

2.1 *Types of research*

The type of research conducted is development research (Research & Development/R&D). The development model used is based on the model developed by Sugiono, namely the ADDIE model. This model consists of 5 stages, namely Analyze, Design, Development, Implementation, and Evaluation (Kurnia et al., 2019). The following is a picture of the stages of the ADDIE model.
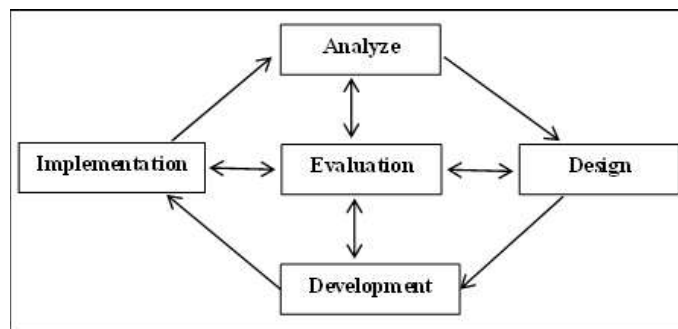

Figure 1: ADDIE Model Stages

At the Analyze stage, it is carried out analysis of student needs by means of direct observation and interviews with the homeroom teacher for IV Class at SDN Karang Mekar 4. Stage Design, here, start making a design or draft of learning media according to the results of the analysis that has been done and prepare various materials and a combination of sizes, colors, and shapes that suit the needs. Furthermore, at the Development stage, learning media begins to be developed according to the results of the analysis and design stages. After the learning media has been developed, the media is validated by validators who are divided into media experts and material experts. At the Implementation stage, learning media that has been declared valid by the validator will be tested on IV Class students of SDN Karang Mekar 4. The last stage is evaluation, namely evaluating whether the product made is feasible and in accordance with what is expected based on needs. The results of the evaluation test are used to measure the effectiveness of the media and the results of the student response questionnaire to measure the practicability of the media.

2.2 Research Subject

The subjects in the development of Fractional *Lempeng* Media were students of SDN Karang Mekar 4 IV Class with a total of 27 students.

2.3 Data Collection Instruments

The instruments used in data collection are validation sheets, response questionnaires, and tests. Validation sheets are given to media expert validators and material experts to measure the validity of the Fraction *Lempeng* Media. To measure the practicality of the media, a response questionnaire is used which is given to students with 10 statement items. And the evaluation test is used to determine the effectiveness of the product developed. The evaluation test is given to students at the end of the learning in the form of 10 questions.

2.4 Data Analysis Techniques

The data analysis techniques used are average scores and percentages. The types of data obtained are qualitative and quantitative data. Qualitative data are obtained from the classification of the validation sheet and student response questionnaire. While quantitative data are obtained from the percentage score of the results of the validation sheet classification, response questionnaire, and test results. Validity and practicability analysis of the media is carried outbased on the formula reference from (Audhiha et al., 2022) as follows.

$$percentage = \frac{score\ obtained}{maximum\ score} \times 100\%$$

Meanwhile, for the analysis of media effectiveness, the final score of the students is first calculated based on the results of the student evaluation test by referring to the following formula. (Panjaitan et al., 2022).

$$final\ score = \frac{score\ obtained}{maximum\ score} \times 100$$

Futhermore, the percentage of classical Completion of students can use the formula

$$p = \frac{T}{n} \times 100\%$$

Information
P = classical completion percentage
T = the amounts students who have completed
N = the amount students who take the test

According to the provisions of the Ministry of Education and Culture in (Munjiati, 2021) that students are said to have completed their studies if they obtain a minimum score of 75 of the ideal score and are considered to have completed classically if they obtain a minimum of 85% from the number of students who have completed their studies. So based on these provisions, the media is declared effective if classically ≥ 85% of students achieve a final score of 75.

The validation criteria used to measure the level of validity of the Fractional *Lempeng* Media can be seen in Table 1.

Table1 Validation Criteria

Interval (%)	Criteria
$0 \leq p < 80$	Invalid
$80 \leq p \leq 100$	Valid

Source: adaptation from Yunianto, et al. (2019)

Information:
p = percentage

The criteria for the practicality of the Fractional *Lempeng* Media used to measure the level of practicality of the Fractional *Lempeng* Media can be seen in Table 2.

Table 2 Product Practicality Criteria

Interval (%)	Criteria
$0 \leq p < 50$	Not Practical
$50 \leq p < 70$	Less practical
$70 \leq p < 85$	Practical
$85 \leq p \leq 100$	Very Practical

Source: Adapted from Audhiha et al. (2022

p = percentage of student questionnaire responses

The conclusion regarding the classification of the practicality of the media was obtained based on the results of the student response questionnaire using the following Guttman scale.

The conclusion regarding the classification of the practicality of the media was obtained based on the results of the student response questionnaire using the following Guttman scale.

Table 3 Guttman Scale

Answer	Score
Yes No	1
	0

Source: Novianti & Susilowibowo (2019)

Based on the results of the data analysis techniques that have been presented, Fractional *Lempeng* Media is said to be feasible if it meets the minimum criteria of being valid, practical, and effective.

3 Results and Discussion

The results of the research and development are in the form of Fractional *Lempeng* Media. Fractional *Lempeng* Media can explain the concept of comparing, ordering, recognizing equivalent fractions, as well as addition and subtraction operations of fractions.

However, this study focuses more on IV Class material according to the learning achievements of the independent curriculum, namely the material on comparing and ordering fractions and recognizing equivalent fractions.

This learning media consists of pieces of fractions with a picture of a "*lempeng pisang*" in the shape of a circle which is a local food of South Kalimantan which functions as a numerator. The pieces of the *lempeng* are then glued using velcro glue onto a striped plate base the size of the pieces of the fraction that have been divided into fractions $\frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \frac{1}{6}, \frac{1}{8}$ and $\frac{1}{12}$ as a fraction denominator.

There are 18 disc bases available with each denominator having three-disc bases. Two blue disc bases serve as fraction operation questions, while one black disc base serves as the result.

As a place to operate fractions, this media provides a small board made of styrofoam. Inside it is provided clear mica to write questions using a marker so that there is no need to provide question cards and answer cards. While the large board functions as a place to put the bases of the plates and their *lempeng* pieces. This large board is then given a cover so that the media lasts a long time, while also being able to provide a sense of curiosity so that it can attract students' interest.

The tools and materials used in making this media consist of styrofoam, paper, paper glue, double tape, velcro adhesive, used cardboard, *kur* rope, photo paper and origami paper. The following is a picture of the Fractional *Lempeng* Media design that has gone through the revision stage.

Figure 2: Front and back cover

The image above is the final design for the cover of Fractional *Lempeng* Media when viewed from the front and back. A rope made of *kur* rope is provided so that the media can be hung.

Figure 3: Fractional *Lempeng* Media Board

The image above is the final design for the Fractional *Lempeng* Media board after going through the revision stage.
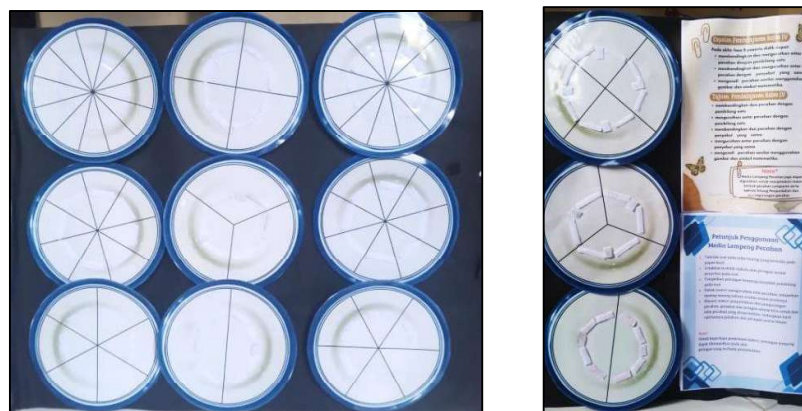

Figure 4: Place the disc base on the right and left

Figure 4 is the final design of the Fractional *Lempeng* Media base, its placement is on the right and left side of the cover. On the left side of the cover there are details on how to use the Fractional *Lempeng* Media as well as learning achievements and learning objectives for IV Class.

The results of the data analysis for the development of Fractional *Lempeng Media* are as follows.

Table 4 Media Validity Analysis

No.	Validators	Total Score	Maximum Score
1	Validator I	39	44
2	Validator II	41	44
3	Validator III	36	36
	Amount	116	124

From the table above, the validation score is calculated using the following formula.

$$percentage = \frac{score\ obtained}{maximum\ score} \times 100\%$$

$$percentage = \frac{116}{124} \times 100\% = 93,55\%$$

Based on the calculation results, with reference to Table 1, then it can be seen that the Fractional *Lempeng Media* meets valid criteria.

Table 5 Summary of Student Questionnaire Results

	Statement	Score
1	Fractional *Lempeng Media* can make me enthusiastic about learning mathematics	26
2	Fractional *Lempeng Media* makes it easier for me to understand fraction material	27
3	The image on the broken plate media is clearly visible	25
4	The size of the numbers on the Fractional *Lempeng Media* is clearly visible	26
5	Fractional *Lempeng Media* makes learning fun	27
6	Interesting Fractional *Lempeng Media* display	26
7	Fractional *Lempeng Media* is easy to use in learning mathematics on fraction material.	25
8	Fractional *Lempeng Media* stimulates my curiosity in learning mathematics	22
9	Fractional *Lempeng Media* makes me more active in learning mathematics	24
10	Fractional *Lempeng Media* made me interested in trying to use it in mathematics learning.	26
	Total Score Acquisition	254
	Maximum Score	270

From the table above, the percentage of media practicality score can be calculated as follows.

$$percentage = \frac{score\ obtained}{maximum\ score} \times 100\%$$

$$percentage = \frac{254}{270} \times 100\% = 94,07\%$$

From the calculations, based on the criteria in Table 2, the practicality of the Fractional *Lempeng* Media is categorized as very practical.

Table 6 Analysis of valuation Test Results

No.	Completion Statement	Amount	Percentage
1	Students who have completed	24	88.89%
2	Students who do not complete	3	11.11%

The table above is the result of the student evaluation test with a classical completion of 88.89%. Before learning using Fraction *Lempeng* Media, the classical completion of students was only 21.87%. This means that there was an increase of 67.02% in the classical completion of students. So according to the criteria for media effectiveness that have been determined, the Fractional *Lempeng* Media is declared effective.

Based on the results of data analysis, the developed media obtained valid criteria. very practical, and effective. So that the Fractional *Lempeng* Media is suitable for use in learning.

4 Conclusion

This research produces a product in the form of Fractional *Lempeng* Media for IV Class students. The developed product obtains valid criteria, is very practical and effective so that it is suitable for use in learning. This is proven based on the results of data analysis; the validity of the media obtained a percentage of 93.55% so that the media was declared valid. the results of the recapitulation of the student questionnaire obtained a percentage of 94.07% so that the media was declared practical. And based on the results of the student evaluation test, it showed that the classical completeness of students increased by 67.02% from before using which was only 21.87% to 88.89% after using the Fraction *Lempeng* Media.

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