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Development of Fraction Material Mathematics Module with Realistic Mathematics Education Learning Approach

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ABSTRAK

This research aims to determine the steps of module development and the level of mathematics module fourth grade with realistic mathematics education learning approach quality. This research includes Research and Development (RnD) with the ADDIE development model. The object and subject in this research is the understanding of grade IV faction material in SD Negeri 2 Riau Silip. The instruments used are speech guidelines, expert assessments, and teacher responses, and student responses. The data analysis technique used qualitative and quantitative data. Qualitative data was analyzed from the results of testing the quality and validity of the module. The results of the research contain development steps, namely analysis stages, resistance to pressure, and resistance to development. The results of the assessments of media experts, material experts, learning experts and language experts obtained the following values of 85.3, 90.7, 80, and 80. While the results of the responses of fourth grade teachers and students were 100 and 92.8, the average assessment and expert validation test and the response of class IV teachers and students was 88.13 with the "Very Good" category. Based on the results of the assessments from the experts, the fourth grade teacher's response, and the student's response it was stated that the fourth grade mathematics modui fraction material with a realistic mathematical education learning approach was included in the "Very Good" category so that it was suitable for use in the classroom learning process.

ABSTRACT

Penelitian ini bertujuan untuk mengetahui langkah pengembangan modul dan tingkat kualitas modul matematika kelas IV materi pecahan dengan pendekatan pembelajaran Realistic Mathematic Education. Penelitian ini termasuk Research and Development (R&D) dengan model pengembangan ADDIE. Obyek dan subyek dalam penelitian ini adalah pemahaman materi pecahan kelas IV pada peserta didik SD Negei 2 Riau Silip. Instrumen yang digunakan berupa pedoman wawancara, lembar penilaian ahli, dan lembar respon Guru serta Peserta Didik. Teknik analisis data digunakan data kualitatif dan kuantitatif. Data kualitatif di analisis secara deskriptif sendangkan data kuantitatif dianalis dari hasil uji kualitas dan kelayakan modul. Hasil penelitian memuat langkah-langkah pengembangan yakni tahap analisis, tahap desain, dan tahap pengembangan. Hasil penilaian ahli media, ahli materi, ahli pembelajaran, dan ahli bahasa diperoleh nilai sebagai berikut 85,3 , 90,7, 80, dan 80. Sendangkan hasil respon guru kelas IV dan peserta didik yakni 100 dan 92,8. Rata-rata penilaian dari

uji validasi ahli dan respon guru kelas IV dan peserta didik yaitu sebesar 88,13 dengan kategori "Sangat Baik". Berdasarkan hasil penilaian dinyatakan bahwa modul matematika kelas IV materi pecahan dengan pendekatan pembelajaran realistic mathematic education sangat layak digunakan dalam proses pembelajaran dikelas.

INTRODUCTION

Learning mathematics is a subject that can be used in everyday life (Putriani et al., 2019) . According to (A. S. Asmara et al., 2022; Banyuajuh et al., 2017; Elok Febriliana et al., 2016; Ismail, 2009) that the reality is, mathematics is still a subject that students hate and fear at school. One of the materials in mathematics that is difficult for elementary school students to understand is fractions (Aldila, 2017; Habibi, 2013; Kania, 2018; Tsai & Li, 2017). Fourth-grade elementary school students have difficulty understanding fractions and their operations and many teachers say they have difficulty teaching fractions (Ananda, 2018). One of the causes of the lack of understanding of students is the lack of teaching materials in elementary schools(Hendra Saputra & Pasha, 2021; Rokhmawati et al., 2019). The learning module is one of the teaching materials that can be used for learning.

The learning module is an effective teaching material used in elementary school learning. In line with Rudi's opinion (Farida & Indah, 2019; I. Lestari, 2018; S. D. Lestari & Wijayanti, 2021; Merwe et al., 2020; Purnomo & Acesta, 2017) that modules are used so that learning can be carried out efficiently. In addition, (Somayasa et al., 2013) state that modules are teaching materials that aim to increase student motivation following the characteristics of students. Grade IV students are at the Concrete Operational level. According to Piaget (Agustina & Rusmana, 2019; Amir & Risnawati, 2011; Ekasari Putri & Hendrayana, 2022; Hikmawati, 2018; Hurlock, 2008; Myers, 2012; Papalia et al., 2015; Saleh et al., 2018; Syawaludin et al., 2019) this level is level at the age of 7-11 years who are more inclined to think logically and are not yet able to think abstractly. For this reason, an appropriate learning approach is needed so that the material can be understood by students. This problem can be overcome by approximation *Realistic Mathematic Education* (RME). According to Suwarsono (Z. Arifin & Humaedah, 2021; Armiati & Sutiaharni, 2021; R. Asmara & Afriansyah, 2018; Do et al., 2021; Halimah et al., 2019; Iskandar & Juandi, 2022; Laurens et al., 2017; Maslihah et al., 2021; Nguyen et al., 2020; Ramadhan et al., 2022; Ramadhani & Caswita, 2017; Revina & Leung, 2019; Rewah et al., 2021; Sepriyanti & Nuri, 2017; Setyawan, 2020; Susanti & Nurfitriyanti, 2018; Trung et al., 2019) advantages *Realistic Mathematics Education* (RME) is mathematics related to everyday experience. RME provides habituation to be more active and independent. In line with the opinion Aldila (2017) states that RME provides the widest opportunity in terms of discussing and building meaningful contexts for each student's understanding.

Research conducted (Ananda, 2018; S. Arifin et al., 2023; Meika et al., 2023; Merwe et al., 2020; Morina, 2014; Mukhlisin, 2021; Ramadhan et al., 2022; A. Sari & Yuniati, 2018; Sintawati et al., 2020; Sumirattana et al., 2017) found that *Realistic Mathematics Education* (RME) can improve learning achievement, understanding of mathematical concepts, and problem-solving skills in Elementary School Mathematics. Research (Sepriyanti & Nuri, 2017) shows the results of the study that the module is based on an approach to *Realistic Mathematics Education* (RME) that can improve students' understanding of concepts about the material system of Linear equations. In addition, research conducted by (Asih et al., 2017) also shows that the PAKEM-based Mathematics

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module can improve understanding of fractional material in elementary schools. Based on the five studies above, a research development was carried out, namely the development of an approach-based module *Realistic Mathematics Education* (RME) about fraction material for class IV.

This research was conducted to describe the development steps and determine the level of quality of the fourth-grade mathematics module on fractional material using an approach to *Realistic Mathematics Education*. It is hoped that this research will be able to provide knowledge of the steps and quality of the fourth-grade mathematics module on fractional material with a learning approach to *Realistic Mathematics Education* so that it becomes a teaching material that is used by teachers and students in improving understanding of fractional material.

METHODS

This research *includes* Research and Development *(R n D) with* Analysis, Design, Development, Implementation, and Evaluation (ADDIE) as the development model. In line with the statement (Cahyadi, 2019; Diantika et al., 2021; Tegeh & Kirna, 2013) that ADDIE is a model for developing teaching materials in systematic learning. This research was conducted at SD Negeri 2 Riau Silip with the target of teachers and students. The instruments used included interview guidelines, product assessment sheets by experts and grade IV teachers, and product use response sheets by students. The method used is a validation of media experts, material experts, learning experts, language experts, and teacher responses and student responses. Data analysis techniques using descriptive qualitative and quantitative. Qualitative data is product development starting from analyzing curriculum and learning outcomes as well as student characteristics, designing modules, developing learning modules, testing them on SD Negeri 2 Riau Silip, and evaluating modules to make them better. The quantitative data includes the results of validation and assessment of teachers and students (Arifin, 2013: 229) with the following formula.

$$\boldsymbol{S = \frac{B}{N}}$$

Information:
$S = Score$
$B = Total\ Score$
$N = Max\ Of\ Total\ Score$

According to Arifin (2013: 229) states that the assessment score on a module that is suitable for use is when the score reaches an achievement level of 61-80, namely in good qualification with the statement that the module is feasible and there is no revision so that it can be used in learning in elementary schools.

RESULTS AND DISCUSSION

The research being carried out is the development of Class IV Mathematics Module Fractional Material with a Learning Approach *Realistic Mathematic Education* (RME) for fourth-grade students at SD Negeri 2 Riau Silip with the ADDIE research model which is only limited to stages *1) Analysis, 2) Design, dan 3) Development* due to the conditions of the COVID-19 pandemic. The Covid-19 pandemic has had a significant impact and must be included with the teacher's role in dealing with it (Al Mawaddah et al., 2021; Handayani, 2020; Jati & Sumarni, 2020; Saputri et al., 2020; D. A. Sari et al., 2020; Sinaga et al., 2021). Development of Class IV Mathematics Module Fractional Material with a Learning

Approach *Realistic Mathematic Education* using the ADDIE research model is often used in RnD research in line with Cahyadi, (2019); Diantika (2021); Masturah (2018); and Rewah (2021) researchs which states that the development of the ADDIE model is often used in the development of teaching materials.

Research on the development of Class IV Mathematics Module Fractional Materials with a Learning Approach *Realistic Mathematic Education* developed based on the ADDIE development model by Branch. Stages of research conducted starting from *Analysis* (Analysis) which includes curriculum analysis, analysis of problems and needs, and material analysis. Furthermore *Design* (Design) includes the preparation of a Class IV Mathematics Module framework on Fractional Materials with a Learning Approach *Realistic Mathematic Education*, determining the presentation of the material, planning the Class IV Mathematics Module Fractional Material with a Learning Approach *Realistic Mathematic Education* for students as well as preparation of research instruments.

The next stage is *Development* (Development), at this stage carry out product development and then the products that have been developed are tested for quality by experts including material experts, media experts, learning experts, linguists, and the response of class teachers and students. Furthermore limited trials were conducted on studentsin the surrounding environment due to the Covid 19 pandemic to measure the feasibility of using the Class IV Mathematics Module, Fractional Materials with a Learning Approach *Realistic Mathematic Education* developed. Stages to evaluate the product being developed so that it becomes a product that is more suitable for use. Activities include collecting data from expert assessment results and student responses as well as classroom teacher responses as a reference for improving the products being developed. The module link can be accessed at the following link. https://bit.ly/modulRME11.

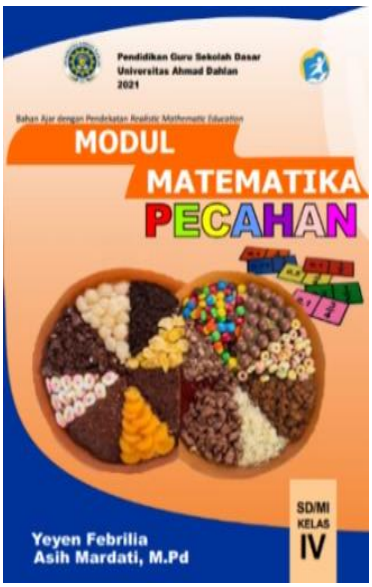

Figure 1. Class IV Mathematics Module with Fractional Materials with a Learning Approach *Realistic Mathematics Education.*

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Figure 2. RME Stages in the Class IV Mathematics Module with Fractional Materials with a Learning *Realistic Mathematics Education* Approach.

Measurement in terms of the quality of Class IV Mathematics Module Fraction Material with a Learning Approach *Realistic Mathematic Education* through validation tests by experts. The results of the assessment by experts and the responses of teachers and students are in table 1.

Table 1. Product Quality Assessment Result Data

No	Validation Expert	Mark
1	Media Expert	85,3
2	Expert Material	90.7
3	Expert Learning	80
4	Linguist	80
5	Class Teacher Response	100
6	Response Participant educate	92.8
	Amount Mark	528.78
	Average	88,13

Based on the table above, shows that the results of the study obtained an average value of 88.13 so the class IV mathematics module contains fractional material with a learning approach *Realistic Mathematic Education (RME)* is said to be in the "Very Good" category.

Class IV math module fraction material with a learning approach *Realistic Mathematic Education (RME)* that has been developed is said to be suitable for use following the criteria presented by Arikunto (2014: 35) that if you obtain a value of 61-80. This module is very suitable for use to increase the independence of students by including evaluation questions and answer keys so that students can evaluate the learning process and learning outcomes. This is in line with the Directorate General of PMPTK (2008) which states that the module is designed to be able to support student self-evaluation and increase student independence. In addition, the module is very practical and easy to use so it is very

accepted by students (R. Asmara & Afriansyah, 2018; Mutmainah & Hermawati, 2021; Riyadi & Qamar, 2020). Mardati (2020) states that the module can be accepted by students because it is practically used in the process of learning mathematics.

Class IV math thematic module fraction material with a learning approach *Realistic Mathematic Education* (RME) which was developed by following the demands of the curriculum. The presentation of the material is under the selected basic competencies and the formulated indicators. Fill in the fourth-grade math module with fraction material using a learning approach *Realistic Mathematics Education* (RME) is also under the material in class IV SD. This is in line with students characteristics (Dialektika & Pgsd, 2016; Istiqomah & Maemonah, 2021). Display of class IV mathematics module fraction material with a learning approach *Realistic Mathematic Education* (RME) to make it more attractive and easy to understand in design by paying attention to image display; type *Font* used *And; font size*. This is in line with research by Anggoro (2015) which states that examples of daily life problems in the module will make it easier for students to understand the content of the material in the module.

Class IV math module fraction material with a learning approach *Realistic Mathematics Education* (RME) for class IV students is appropriate as teaching material in the learning process in class (Ramadhan et al., 2022). Development of grade IV mathematics modules on fractional material with a learning approach *Realistic Mathematics Education* (RME) under fourth-grade elementary school students. This is Piaget's opinion (Rukiyah, 2014: 11) that students at that age still like real things. In line with what was stated (A. Sari & Yuniati, 2018) that the basic understanding of students determine the analysis of students' needs both in material and learning methods.

Apart from this, this module uses a learning approach *Realistic Mathematic Education* (RME) is capable of delivering that experience *real* in students in line with research (Shandy, 2016) and (Sintawati et al., 2020) stated with *Realistic Mathematics Education* can an approach to increasing student understanding. In addition, the approach *Realistic Mathematic Education* used in the development of this math module Because *Realistic Mathematics Education* (RME) solving problems in its way by working on sample questions and evaluation questions in the module as with Chisara's research (2018) which states that the module steps consist of the following. The first provides contextual problems, the second solve problems independently, the third creates interaction, the fourth can compare and discuss solutions, and the fifth can conclude the results of the discussion.

Class IV math module fraction material with a learning approach *Realistic Mathematic Education* This is different from the class IV mathematics module for fractional material with a learning approach *Realistic Mathematic Education* (RME) in general, which includes examples in everyday life and changes the fearful view of learning mathematics. This is as stated by (Tandililing, 2010), which states that through the approach to *Realistic Mathematics Education*, Mathematics is becoming more interesting and in demand. Fractions are one of the materials that students do not understand. This module contains fraction material that students can understand as research conducted (Ananda, 2018; Asih et al., 2017; Ekawati, 2008; Luh et al., 2021; Pagi et al., 2018; Qomalasari & Respati, 2021; Ramadhan et al., 2022; Saleh et al., 2018; Shanti et al., 2018; Tsai & Li, 2017; Unsri, n.d.) that learning about fractional material is applied with an approach to *Realistic Mathematics Education* can improve critical thinking skills; creative; And; student communication. Apart from that (A. Sari & Yuniati, 2018) also explain that the application *Realistic Mathematics Education* has a positive influence on students' mathematical understanding.

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Based on the description above, we can see that Mathematics Module IV teaches fractional material using a learning approach *Realistic Mathematics Education* (RME) very feasible to use, and can enable students to continue to search for information independently and effectively used in learning by teachers in class. Class IV Mathematics Module Fractional Material with a Learning Approach *Realistic Mathematic Education* existing ones can also increase the success achieved by students in learning activities. in the mathematics learning process of students. This is reinforced by the results of previous studies (Buchori & Rahmawati, 2017; Habibi, 2013; Mariyana et al., 2018; Pagi et al., 2018; Wulandari et al., 2019) and validation of experts and the response of Class IV Teachers and Students. Class IV Mathematics Module Fractional Material with a Learning Approach *Realistic Mathematic Education* which was developed can improve the learning process of Mathematics in Elementary Schools.

CONCLUSION

Based on the results of research and development of grade IV math modules on fractional material using a learning approach *Realistic Mathematic Education* (RME), it can be concluded that the development of class IV mathematics modules on fractional material with a learning approach *Realistic Mathematic Education* (RME) with the ADDIE development model includes stages *Analysis* that is done curriculum analysis; problem; needs and; material. Stage *Design* with the preparation of the Mathematics Module framework. Stage *Development* tested for quality by experts including experts and the response of class teachers and students is limited in the surrounding environment because of the *pandemic covid*. Quality of class IV mathematics module Fractional material with a learning approach *Realistic Mathematic Education* (RME) is declared very good with an average of 88.13. The details of the value of the assessment and its categories are as follows: media experts at 85.3 in the "Very Good" category; material at 90.7 in the category "Very Good"; learning expert at 80 in the category "Good"; linguists of 80 with the category "Good"; class teacher response of 100 with the category "Very Good" and; the student response was 92.8 in the "Very Good" category. The presence of this module is expected to be able to provide an overview and solutions related to mathematical problems and become one of the references in developing modules and further research related to Realistic Mathematics Education. Mathematics Modul Grade IV Material Fractions with a Learning Approach *Realistic Mathematic Education* There are still many limitations. Therefore, future writers are expected to be able to further develop the material presented and be able to create teaching materials that are more interesting for students in a learning process that is more innovative and better in terms of design and content. Other than that, in the time of the pandemic, *COVID-19* This research has not yet reached the stage of extensive trials. And expected in the future can be tested on a large scale.

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