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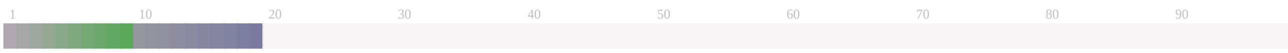

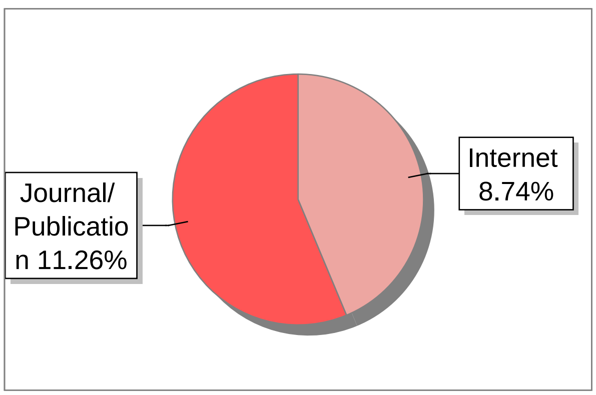

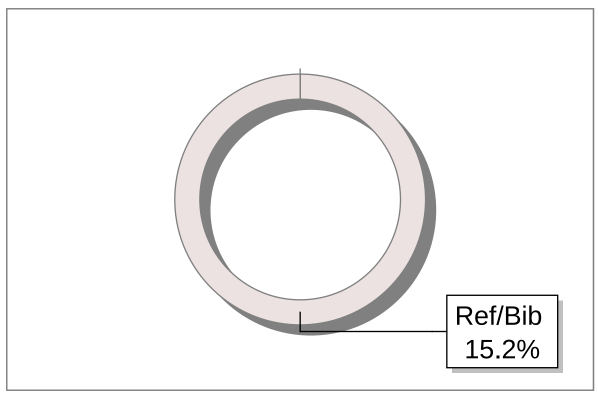

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DEVELOPMENT OF MATHEMATICS MODULE ON FRACTIONAL NUMBERS FOR FIFTH GRADE ELEMENTARY SCHOOL STUDENTS

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ABSTRACT

In elementary mathematics learning there is fractional number material. This material has a level of difficulty that is quite challenging in learning. The concept of fractions is taught as much as possible by using more realistic and contextual concepts and minimizing abstract teaching. In abstract mathematics learning, students need tools in the form of media and teaching materials that can clarify what will be conveyed by the teacher so that students understand and understand more quickly. This study aims to (1) develop a mathematics module on fractions for elementary school students; (2) determine the feasibility of the mathematics module on the developed fraction material. This study applies a design research type of development study. The stages carried out in the design research type of development study are: (1) Preliminary research, (2) Prototyping stage, (3) Summative evaluation, and (4) Systematic reflection and documentation. The instruments used in this study were a validation questionnaire by experts and a student response questionnaire. This research has resulted in a module developed in the form of a mathematics module on fractional number material for fifth grade elementary school students to improve students' mathematical literacy which refers to the 2013 revised 2018 curriculum. The feasibility of the developed module is very feasible with an average eligibility percentage of 93.6%. The practicality of the module used is very practical with an average practicality percentage of 94.34%.

INTRODUCTION

Mathematics learning needs to be given to all students in elementary schools because mathematics can equip students with the ability to think logically, analytically, systematically, critically, and creatively as well as good cooperation skills (Ayal et al., 2016; Kenedi et al., 2019; Lince, 2016). Mathematics learning is given at the elementary school level starting from grade I to grade 6. However, mathematics subjects are always considered difficult for elementary school students because mathematics subjects contain calculations, symbols, and abstract concepts (Gray et al., 1999; Swadener & Soedjadi, 1988). Basically mathematics is an important subject that must be understood by elementary school students. Therefore, there must be an elimination that mathematics is said to be a subject that elementary school students do not like because it is considered difficult. The best way is to present the material packaged in an attractive manner so that it can arouse students' motivation to learn and like mathematics so that it will be easy to understand the material (Buchori & Setyawati, 2015; Rahmi & Helsa, 2018). Mathematics has a final learning goal, namely so that elementary school students are skilled in using various mathematical concepts in everyday life (Benson-O'Connor et al., 2019; Kenedi et al., 2019; Putnam, 1992). The general purpose of giving mathematics at the elementary school level includes two things, namely (1) preparing students to be able to deal with changing circumstances in life and an ever-evolving world, through training in acting on the basis of thinking logically, rationally, critically, carefully, effective and efficient, (2) prepare students to be able to use mathematics and mathematical patterns in everyday life and in studying science (Özgeldi & Esen, 2010; Rowland, 2008).

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One of the efforts to meet the objectives of learning mathematics is the efforts of teachers who are able to create effective and fun learning that can also provide learning resources, media for learning, design activities that must be carried out by students, regulate time allocation, provide learning places, and regulate classroom management (Moyer, 2001; Putnam & Borko, 2000). Mathematics learning is given in elementary schools, of course, with the provision of materials that are suitable for the different abilities of students in each class. The scope of mathematics learning in the standard content of SD/MI education units includes aspects of natural numbers and simple fractions, simple geometry and measurement, and data processing (Schneider et al., 2009). Characteristics of learning mathematics in elementary schools include: (1) implementing mathematics learning in stages, (2) learning mathematics following the spiral method, (3) learning emphasizing an inductive approach, (4) learning mathematics adhering to the truth of consistency (Breton, 2021; Juandi et al., 2021). Carrying out mathematics learning according to the material based on its characteristics will be easily accepted by students. All the material in the content standard is given to elementary schools, of course, by sorting from the easiest to the most difficult material for grades 1 to 6. In learning mathematics there is material on fractional numbers. This material has a level of difficulty that is quite challenging in learning. The concept of fractions is taught as much as possible by using more realistic and contextual concepts and minimizing abstract teaching. In abstract mathematics learning, students need tools in the form of media, and teaching aids that can clarify what will be conveyed by the teacher so that students understand and understand more quickly (Utomo et al., 2021).

Learning mathematics requires media and teaching materials to strengthen every abstract concept that has just been understood by elementary school students so that it can last a long time in their memory. However, the lack of media use can hinder the process of implementing mathematics learning. Based on observations and interviews conducted by researchers, this happened in the fifth grade of SD Muhammadiyah. Researchers made observations at the elementary school to conduct a needs analysis because the media was developed so that it could be used in classroom learning. The researcher conducted a needs analysis by observing and interviewing the fifth grade teacher of SD Muhammadiyah Kutoarjo on March 14, 2021. Based on the interview with the fifth grade teacher, mathematics lessons need the help of researchers to solve learning problems, especially fractions because teachers think students do not understand fractions. Researchers continued interviews and observations with the results of the implementation of learning fractions in class V in the learning process experiencing difficulties. The concept of fractions is not fully understood by all students, to calculate similar fractions, operate fractions, have difficulty. Only a few students understand and are able to solve problems related to fractional arithmetic operations. Based on the results of these observations and interviews, the researcher also obtained a needs analysis that SD Muhammadiyah Kutoarjo needed teaching materials given in class V. So it can be concluded that it is necessary to develop teaching materials in the form of modules that can help the school in learning mathematics with fractions. Researchers want to develop teaching materials in the form of fractional math modules to help students achieve learning objectives.

RESEARCH METHOD

This research is a type of R & D (Reseach and Development) research using the Nieeven development model with the development stages, namely preliminary research (literature review), prototyping stage (designing design instructions), summative evaluation (summative evaluation), and systematic reflection and documentation (write the entire study). The preliminary research stage includes problem analysis, needs analysis, curriculum analysis and material analysis so that the results of the analysis require a mathematics module on fractional number material. The second stage, namely the prototyping stage, includes module design planning, module design, design of supporting devices, module development and module validation carried out by material expert lecturers and media expert lecturers. Then in the third stage, which is a summative evaluation, which includes a practicality test and a test of the effectiveness of the developed module. The last stage is systematic reflection and documentation. At this stage, the entire study is written to support the analysis, then performs the specification of the design principles and articulates their relationship with the established framework of thinking, so that this stage can be carried out simultaneously with the previous stages. The module trial was carried out with a limited trial, where previously the product had been validated by an expert validator, namely 2 material expert validators and 1 media expert validator. The subjects of the limited trial were 10 fifth grade students of SD Muhammadiyah Kutoarjo as subjects for the practical test. The instrument of data collection was carried out by giving validity questionnaires to material experts and media experts, for practicality instruments the module was given a practicality questionnaire.

RESULTS AND DISCUSSION

The result of this development research is a product in the form of a mathematical module on fractional number material for fifth grade elementary school students. The product trial results data were obtained from various sources, namely through assessment sheets or validation of material experts and media experts, as well as limited trials to 10 fifth grade elementary school students. The trial was only carried out on a small group in a limited manner with due observance of health protocols. The following is a summary of the results of research and data analysis of research that has been carried out. The development model used to develop teaching material products in the form of modules refers to the steps for developing a design research type of development study, namely: (1) Preliminary research, (2) Prototyping stage, (3) Summative evaluation, and (4) Systematic reflection and documentation. The development of the fractional number operation module for fifth grade elementary school students aims to produce a teaching material in the form of a module that can be used to maximize mathematics learning, especially in fractional number material. At the preliminary research stage, data were obtained about problems in the learning process carried out in the classroom, namely the learning process was still using conventional learning models (lectures) which led to teacher-centered learning. In the needs analysis, information was obtained that the teaching materials used were in the form of textbooks and worksheets that emphasized the content dimension, while the curriculum used was the 2013 curriculum so that the models and teaching resources were less effective in learning the 2013 curriculum and less effective in learning mathematics. obtained at the preliminary research stage is used to carry out development planning at the prototyping stage. At the prototyping stage, a module design is developed which is in the form of a fractional number operation module. An overview of the fractional number operation module can be seen in Figure 1.

Figure 1. Overview of the Fractional Mathematics Module

Furthermore, the development of the developed module is carried out by compiling the module parts consisting of pre-introduction, introduction, content, and closing. After the design is done, validation is carried out. Validation was carried out by 2 material expert validators and 1 media expert validator. The data on the validity of the modules based on the assessments of material experts and media experts can be seen in Table 1.

Table 1. Module Practicality Data

Validator	Score	Eligibility Category
Material Expert 1	98,4%	Very good
Material Expert 2	84%	Very good
Media Expert	98,5%	Very good
Average	**93,6%**	**Very good**

The assessment by the material expert validator consists of 3 aspects, namely the cover and content aspects of the material, learning aspects, and linguistic aspects. The assessment of cover and content from material expert validators was 83.07% and 97.33%, respectively, with an average percentage of 90.2% which was categorized as very good. Learning assessments from material expert validators are respectively 85% and 100% with an average presentation of 92.5% which is categorized as very good. The linguistic assessment of the material validators is 84% with a very good category. Based on expert lecturers' assessments, the overall average assessment by material validators of the developed modules is 93.6% with a very good category. The assessment by media expert lecturers consists of 2 aspects, namely the cover aspect and the display and presentation aspect. The cover aspect assessment is 100% and the display and presentation aspect assessment is 97%. The average acquisition of the media expert's assessment is 98.5% in the very good category. Overall, the average percentage score of all validators is 93.6% or in the very good category. Thus the mathematics module on fractional material can be said to be feasible as a mathematics teaching material. At the summative evaluation stage, limited trials were conducted to determine the practicality of the mathematics module. To assess the practicality of the developed module, a limited trial was conducted on 10 fifth grade students and observations will be made to assess the implementation of the lesson plans. The practicality data from the results of the limited trial of 10 students can be seen in Table 2 while the data on the implementation of the RPP can be seen in Table 3.

Table 2. Module Practicality Data

Practitioner (Student)	Score	Eligibility criteria
student 1	95%	Very good
student 2	93,3%	Very good
student 3	93,3%	Very good
student 4	93,3%	Very good
student 5	96,7%	Very good
student 6	96,7%	Very good
student 7	93,3%	Very good
student 8	96,7%	Very good
student 9	91,7%	Very good
student 10	93,3%	Very good
Average	**94,33%**	Very good

The limited test to students was carried out by 10 fifth grade students of SD Muhammadiyah Kutoarjo in the odd semester of 2021/2022. The results of the student response questionnaire consisted of 4 aspects, namely motivation, language, material, and graphics. The results of the assessment of 10 fifth grade elementary school students on the motivational aspect is 94%, the linguistic aspect is 94%, the material aspect is 92.5% and the graphic aspect is 100%. Based on the assessment of these four aspects, the average overall assessment of 10 fifth grade elementary school students is 95% with a very good category.

Table 3. RPP Implementation Data

Meeting	Gain	Category
RPP 1	92 %	Very good
RPP 2	100 %	Very good
Average	**96 %**	Very good

The implementation of the learning components carried out in accordance with the lesson plans that have been made. Based on the assessment through the observer sheet, the data on the implementation of the lesson plans at the first meeting was 92%, and the second meeting was 100%. Based on this assessment, the overall average implementation of the RPP is 96% in the very good category. There are several factors that affect the high and low percentage of the implementation of learning carried out, namely the time setting for each activity that must be regulated as well as possible and the systematic learning stages that must be considered properly, so that if these factors can be regulated properly then the implementation of learning can take place. well. Of course, all activities in the limited trial with the mathematics module on the material of number operations still pay attention to health protocols. In the last stage, namely systematic reflection and documentation, researchers collect all the data obtained for analysis and revision. This stage is carried out simultaneously with the previous stages. Based on the foregoing, it can be concluded that the fractional number math module can be said to meet the feasibility and practicality aspects. It is hoped that this mathematics module can improve mathematical literacy, interest in learning which in the end obtains the expected learning outcomes. This is due to the study module which contains the dimensions of context, knowledge, competence and attitudes of the material being taught as expected in improving students' mathematical literacy, besides that it is also prepared based on the 2013 revised 2018 curriculum and includes cognitive, affective, and picomotor aspects so that the objectives learning can be carried out well.

CONCLUSION

Based on the results of research and data analysis, it can be concluded that this research has produced a module developed in the form of a mathematics module on fractional number material for fifth grade elementary school students to improve students' mathematical literacy which refers to the 2013 revised 2018 curriculum. The feasibility of the developed module is very feasible. with an average eligibility percentage of 93.6%. The practicality of the module used is very practical with an average practicality percentage of 94.34%.

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