# Development of Realistic Based Interactive Media to Improve Class IV Elementary School Learning Outcomes

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**Abstract:** The learning process is a communication process and takes place in a system between interactive media and learning tools. This research was carried out with a 4-D approach. The products developed were validated by experts and then tested on grade IV elementary school students. Of the four validators who had conducted the assessment, an average of 86% was obtained with a very valid category. There are nine aspects assessed, namely aspects of accuracy, completeness, interest, providing learning opportunities, providing assistance for learning, motivational quality, learning flexibility, social quality of instructional interactions, can have an impact on students, and can have an impact on teachers and their learning. The results of the practicality test by grade IV teachers of SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati showed that the interactive media based on RME that had been developed obtained very practical results with a practicality percentage of 92%. The results of the practicality test by grade IV students of SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati showed that the interactive media based on RME in mathematics learning that had been developed had a practicality percentage of 91% and was included in the very practical category. The results of the effectiveness test by grade IV students of SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati showed that the interactive media based on RME that had been developed was effective in use with an average value of 0.74 with an effective category using the N-gain percentage. The Development of Interactive Media Based on Realistic for Grade IV Elementary Schools is a valid, practical and effective learning media

**Keywords:** Interactive media; Learning outcomes; Realistic

## Introduction

Learning literacy is very important to improve. The reason it is important to learn numeration is because it has many uses in everyday life (Rakhmawati & Mustadi, 2022). By learning numeration are able to do calculations, both simple and those that require high level knowledge (HOTS). According to Khadijah (2016) learning is expected to be able to turn students into humans who think logically, critically, diligently and responsibly and are able to solve problems related to the developmental phase and scope of problems in the child's everyday environment. Solving problems is also part of the childhood phase but is still at a simple level so elementary school students also study the topic of fractions in mathematics lessons (Carpenter & Moser, 2020). Fractions are one of the topics in mathematics subjects studied in elementary school (SD). The topic of fractions is taught from class III to class VI with different Learning Outcomes (CP). One of the CPs taught regarding the topic of fractions in class IV is Expressing decimal fractions in tenths and hundredths and connecting decimal fractions in hundredths with the concept of percent. Fractions in mathematics relate to

various situations in everyday life. Considering the importance of the topic of fractions, it should be taught optimally to students from elementary school (Puspita et al., 2023).

One of the factors that causes this problem is the ineffective learning process carried out by the teacher (Erlangga, 2022). Teachers in teaching mathematics generally use the lecture method or what is better known as chalk and talk. This results in many students experiencing problems in understanding mathematical ideas or concepts. So that most students memorize the concepts taught by the teacher. Another problem related to the mathematics learning methods used by teachers is that they tend to teach mechanistically (Dood & Watts, 2022). In the mechanistic learning process, it begins with the teacher explaining the material on operations for calculating fractions and accompanied by several examples in the textbook, then students are asked to complete exercises based on the examples they have studied. Students are not invited to understand the rationale behind the fraction calculation operations material they are studying. Teachers focus more on students memorizing the methods given for solving problems in textbooks rather than stimulating students to construct knowledge for problem solving (Ozdem-Yilmaz & Bilican, 2020).

Through this research the author realizes that if learning is more active, creative, innovative and fun, the use of learning media is really needed. Media is an inseparable part of the learning process (Vagg et al., 2020). Arsyad (2014) states that apart from being a transmitter of learning information/messages, media can direct and increase students' attention, so that it can lead to interaction between students, student motivation, student interest and independence in learning. In line with Marpaung & Siagian (2016) who state that media can help teachers to improve students' learning achievement. Learning media has several advantages, helps teachers in conveying learning (Sudarsana et al., 2020); stimulates students' thoughts, feelings and desires (Hasanah et al., 2023); learning becomes effective, efficient and enjoyable (Abdulrahaman et al., 2020); students easily understand the subject matter; making media can increase teacher creativity and innovation; and improve student learning outcomes.

According to Ekayani (2017) learning media is generally a tool to help the teaching and learning process. Apart from that, learning facilities are anything that can be used to stimulate the thoughts, feelings, attention and capabilities or skills of the student so that they can encourage the learning process. These limitations are quite broad and deep, including understanding resources, environment, people and

methods used for learning/training targets. Meanwhile, according to (Nurrita, 2018), learning media is a tool that can support the teaching and learning process so that the meaning of the message conveyed is better understood and educational or learning objectives can be achieved effectively and efficiently. Then according to Putriana (2022) learning media is part of learning resources which is a combination of software (learning materials) and hardware (learning tools). Because the learning process is a communication process and takes place in a system between interactive media and learning tools, learning media occupies an important position in the learning system. Without media, communication will not occur and the learning system as a communication system will not be able to occur optimally.

Learning media is an integral component of the learning system. Therefore, learning media is considered as an introduction to communication between teachers and students. If in the learning process a teacher uses learning media, it will help develop students' cognitive, psychomotor and affective knowledge. By using learning media, we can help students to solve the problems they are facing. Choosing the right learning media can have an influence on achieving learning goals. Therefore, teachers are required to design learning media by utilizing computer technology. One way to create learning media with the help of computer technology is to create learning media.

Philosophically, interactive-based learning media needs to be developed because it can help teachers in the learning process. The use of learning media is very useful in the learning process, one of which is thematic learning. Because of its broad scope, the use of interactive media-based learning media can help students easily master the material in RME subjects. This interactive media-based learning media contains thematic learning material, videos and practice questions for students' understanding. Poobrasert & Cercone (2009) states that interactive media is designed to include images, videos, sounds and animations that are relevant to the subject.

This learning media contains colorful pictures with displays that attract students to be more enthusiastic about learning. Creating interactive media can stimulate students' attention, interest, thoughts and feelings when learning. Interactive media used in learning is an excellent means to improve the learning system together by providing additional opportunities for students to develop skills, identify problems, organize, analyze, evaluate and communicate information.

In creating this learning media, you need to use applications and software. Of all the existing applications and software, researchers use PowerPoint. Researchers chose PowerPoint because it has several

advantages over other applications, namely in creating media you don't have to be connected to the internet; it's not expensive; it's not paid; you don't need to install the application because PowerPoint is available in all applications. Windows computer or laptop, so that teachers and students can easily access it; and it can be applied and accessed anywhere, such as a computer, laptop or cellphone (HP).

The cultivation and development of mathematical problem-solving abilities cannot be separated from the role of teachers, one of which is how teachers stimulate students to learn mathematics and support the development of their thinking. However, the mathematics learning process in Indonesia has not been able to stimulate students to learn mathematics. This is supported by the opinion of Yulia et al. (2020) who explain that the habit of students to listen and see the teacher in solving problems without doing it themselves is one of the factors in the weakness of students' problem solving abilities.

The low ability to solve mathematical problems can also be seen from the results of research conducted by Yulia et al. (2020) which states that students' problem solving abilities are still relatively low. Apart from that, Fauzan & Yerizon (2013) also said that students' problem solving and reasoning abilities have not developed optimally. Most students experience difficulties when faced with problem solving questions and questions that require mathematical reasoning. Students' problem solving abilities are not yet optimal because the learning process is not optimal.

In supporting the evidence of problems from previous findings, the author reviewed the initial abilities of class IV students at SD Islam Al-azhar 32 Padang on January 9 2024 on the topic of fractions that had been studied in class IV semester 1. The aim of giving the test was to determine learning barriers. obstacle) students in the material of changing percent into ordinary fractions that have been studied. The test questions are adapted to the questions contained in the Class IV Mathematics book.

## Method

This research uses the Research and Development method which is later shortened to R&D. This method is a method that aims to produce a product and is tested to determine its effectiveness (Sugiyono, 2015). Gall states that the R&D method is based on industry demands that use the findings in research to develop desired new procedures and products (Sartono et al., 2022). The aim of R&D research is to produce new products and test the effectiveness of these products. The output of the

development product can be software or hardware, (Richey & Klein, 2014).

This research was carried out following the 4-D stages, namely define, design, develop and disseminate. The product developed was validated by experts and then tested on fourth grade elementary school students. During the trial, the implementation of the interactive media used by students was observed. The stages of the 4D model are: define, contains activities to determine what product will be developed, along with its specifications; design (planning), contains the activity of creating a design for a predetermined product; development, consists of activities to make the design into a product and test the validity of the product repeatedly until the product is produced in accordance with predetermined specifications; and dissemination, contains the activity of distributing product trials and is given a pre-test question and a post-test question that will be tested before and after using the material.

This research uses primary data as a data source, which is obtained from collecting data provided directly. Primary data was obtained from media experts, material experts, language experts, teachers and students obtained from interviews, questionnaires and giving tests. The primary data consists of: validation scores from media experts, material experts, language experts; practicality scores from teachers and students; and effectiveness scores from student tests.

*Data Analysis Techniques*
*Validity analysis*

The results of the validity (feasibility) of interactive media based on Realistic Mathematic Education (RME) were obtained from analyzing validation sheets that had been assessed by expert validators. Data from expert validators such as criticism, input and suggestions will be analyzed and used as a reference to make the product being developed better. The measurement scale uses a 5 (five) scale. Next, the scores obtained for each aspect of the assessment will be added up and the average calculated. The average score from the validation results will be obtained from the total scores from the validation results divided by the number of aspects assessed, using the Formula 1 (Sudjana, 2016).

$$\bar{X} = \frac{\sum X_i}{n} \tag{1}$$

Information:
$\bar{X}$ = Average validation score
$\sum X_i$ = Total score from validation results
n = Number of aspects assessed

*Practicality Analysis*

Obtained by analyzing data obtained from teacher and student response questionnaires. In this study, a measurement scale on a scale of 5 (five) was used. Practicality test data from the products developed were analyzed using percentages (%). To find out the percentage of practicality scoring, the author uses Formula 2.

$$Percentage = \frac{Obtain\ Score}{Maximal\ Score} x100\% \qquad (2)$$

*Effectiveness Analysis*

The effectiveness of the product that the author developed was found from analysis of test results given to students. The test is carried out after the teacher tries out the product on students. To determine the effectiveness of the test scoring results, the author uses according to Purwanto et al. (2012) as shown by Formula 3.

$$NP = \frac{R}{SM} x100\% \qquad (3)$$

Information :
NP: Percentage of acquisition value
R: score obtained
SM: maximum score

If the student's completeness is greater than or equal to the minimum completion criteria, then the student is declared to have passed. And conversely, if a student's completeness is lower than the minimum completion criteria then the student is declared incomplete. If the ratio of the number of students who get scores above the minimum completion criteria is greater than the number of students who get scores below the minimum completion criteria, then the interactive media developed can be declared effective. However, if the ratio of the number of students who get scores above the minimum completion criteria is smaller than the number of students who get scores below the minimum completion criteria, then the interactive media being developed cannot be declared effective in improving student learning outcomes.

**Results and Discussion**

*Validity Results*

The interactive media that has been designed is followed by validation activities by expert lecturers according to their field of study consisting of 3 lecturers from the Faculty of Education, Basic Education Study Program and 1 teacher who has previously completed a Masters in Education at Padang State University. Suggestions for improvement provided by the validator are used to revise the interactive media. Before being validated, this RME-based interactive media was revised according to the validator's suggestions.

The following describes the results of the validity of interactive media with the Development of Interactive Media Based on Realistic Mathematic Education (RME) in Class IV Mathematics Learning at SD ISLAM AL-AZHAR 32 Padang. The numbers entered in the table indicate the assessment score from the validator. Brief validation results can be seen in Table 1.

**Table 1.** Results of interactive media validation by validators

| Validator | Score % | Categories |
| --- | --- | --- |
| Content I | 89 | Very valid |
| Content II | 83 | Very valid |
| Language | 94 | Very valid |
| Display | 80 | Valid |
| Average | 86 | Very valid |

*Practicality Results*
*Practicality Results by Teachers*

Test the practicality of interactive media based on Realistic Mathematic Education (RME) in fourth grade Mathematics learning by teachers. The practicality results obtained by teachers using the practicality test questionnaire are presented in Table 2

**Table 2.** Results of Practicality of Interactive Media by Teachers

| School | Score | Percentage % |
| --- | --- | --- |
| SD IT Nurul Ikhlas | 100 | 92 |
| SD Islam Al-Azhar 32 | 84 | |
| SD IT Buah Hati | 93 | |

Based on the table above, it can be explained that the percentage of interactive media based on Realistic Mathematic Education (RME) in class IV Mathematics learning by teachers is 92% in the very practical category. This shows that RME-based interactive media to improve Mathematics learning outcomes for class IV students can practically be used by teachers as interactive media.

*Practicality Results by Students*

Apart from teachers, practicality tests are also carried out on students. Practicality data was obtained using a practicality test questionnaire which is briefly shown in Table 43.

**Table 3.** Results of interactive media practicality by students

| School | Score % | Categories |
| --- | --- | --- |
| SD IT Nurul Ikhlas | 92 | Very Practical |
| SD Islam Al-Azhar 32 | 91 | Very Practical |
| SD IT Buah Hati | 91 | Very Practical |
| Average | 91 | Very Practical |

Based on the Table 3, you can see the response results from 35 class IV students at SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati towards interactive media based on Realistic Mathematic Education (RME) in Mathematics learning for class IV with an average of the average practicality of interactive media is 91% and the Very Practical category.

*Effectiveness Results*

Effectiveness analysis was carried out using pre-test questions to obtain data on learning outcomes of students' initial knowledge before learning activities, while post-test questions were used to obtain data on student learning outcomes after using RME-based interactive media with the post-test questions being the same as the pre-test. The number of students in class IV at SD IT Nurul Ikhlas, SD Islam Al-Azhar is 32, and SD IT Buah Hati is 35 students. The number of questions on the question sheet is 10 objective questions and 5 essay questions. The following is an analysis of its effectiveness in Table 4.

**Table 4.** Effectiveness Analysis

| School | Average N-Gain | Criteria |
|---|---|---|
| SD IT Nurul Ikhlas | 0.80 | Effective |
| SD Islam Al-Azhar 32 | 0.71 | Effective |
| SD IT Buah Hati | 0.71 | Effective |
| Average | 0.74 | Effective |

Based on Table 4, an analysis of effectiveness can be obtained using pre-test and post-test questions on RME-based interactive media in class IV elementary school with an average of 0.74 meeting the effective criteria, which means that the interactive media developed is effective in learning Mathematics in class V Elementary school.

*Discussion*

According to Veronika & Zainil (2020) "The Indonesian Realistic Mathematics Education Approach (PMRI) is a mathematics learning theory which is commonly known as the Indonesian realistic mathematics approach. PMRI is an approach that uses real world situations and students' experiences as a starting point for learning mathematics."

Based on the validation results carried out with the validator, it shows that RME-based interactive media that has been validated gets valid results with an average of 86%. This figure is obtained from the average of the 4 scores from four validators, namely material experts, teachers, display experts and language experts.

Of the four validators who have carried out the assessment, they got an average of 86% in the very valid category. There are 9 aspects assessed, namely aspects of accuracy, completeness, interest, providing learning opportunities, providing assistance for learning, motivating quality, flexibility of learning, social quality of instructional interactions, can have an impact on students, and can have an impact on teachers and their learning. In interactive media the material has been adjusted to the readability aspect of the text, where in interactive media the existing material has been adapted to the independent curriculum, with Basic Competencies and indicators to be achieved (Nuraripin & Jaja, 2021).

The results of practicality tests by fourth grade teachers at SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati showed that the RME-based interactive media that had been developed had very practical results with a practicality percentage of 92%. This shows that the RME-based interactive media developed can make it easier for teachers to explain the material and help the teacher's role as a facilitator. This is in line with Rosa's (2015:53) opinion that interactive media is interactive media that can be used by students to learn independently with minimal assistance from the teacher.

The results of practicality tests by fourth grade students at SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati show that RME-based interactive media for mathematics learning has been developed with a practicality percentage of 91% and is in the very practical category. This figure was obtained from the average of the five practical aspects of RME-based interactive media assessed by students.

The results of the effectiveness test by fourth grade students at SD IT Nurul Ikhlas, SD Islam Al-Azhar 32, and SD IT Buah Hati showed that the RME-based interactive media developed was effective in use with an average score of 0.74 with the effective category using the percentage N -gain. The results of the effectiveness test were carried out by 23 students by giving pre-test questions before learning and post-test questions after learning.

*Research Constraints and Limitations*

The obstacles found in the development of contextually based RME-based interactive media are that researchers realize that in this research there will definitely be many obstacles and obstacles. This is not due to deliberate factors, but due to limitations in conducting research. Even though this research has been carried out as optimally as possible, the researcher realizes that this research is not free from errors and shortcomings, this is due to the limitations below:
*Material Limitations*

This research is limited to mathematics learning in class IV fractions, first semester of elementary school.
*Limited abilities*

Research cannot be separated from theory, therefore the researcher is aware of the limitations of abilities, especially scientific knowledge and learning methodology which still has many shortcomings, but the author has tried his best to carry out research in accordance with the scientific abilities and guidance of the supervisor.

*Time limitations*

Research carried out by researchers is constrained by time, because the time used is very limited. Even though the time used by researchers is quite short, it can fulfill the requirements of scientific research.

## Conclusion

Interactive media interactive media Based on Realistic Mathematic Education (RME) on the topic of fractions in grade IV of Elementary School obtained the following conclusions: The validity of interactive media based on RME on the topic of fractions in grade IV of Elementary School that has been developed got an average of 86% with a very valid category; The practicality of interactive media based on RME on the topic of fractions in grade IV of Elementary School that has been developed got an average percentage of 92% by teachers and 91% by students with a very practical category; and The effectiveness of interactive media based on RME on the topic of fractions in grade IV of Elementary School with an average N-Gain of 0.74 with an effective category.

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