

THE DEVELOPMENT OF RME-WORKSHEETS ON MULTIPLICATION MATERIAL FOR PRIMARY SCHOOL STUDENTS

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ABSTRACT

Student Worksheets (LKPD) are teaching materials that help teachers deliver content to students. With LKPD, students find it easier to understand the material and become more motivated in the learning process. However, in practice, teachers are accustomed to using LKPDs purchased from book sales representatives, which often fail to present contextual problems as the starting point of the learning process. This study aims to produce valid teaching materials in the form of LKPD using the Realistic Mathematics Education (RME) approach on multiplication material for elementary school students. The research follows a design research method of the development studies type. This study was limited to prototype 2, which underwent a formal review by three experts: two senior teachers as subject matter experts and one lecturer as an education expert. using an expert validation instrument. The data collection technique used was qualitative data obtained from observations and interviews. The results show that the developed LKPD is very valid. It achieved an average validity score of 90%, placing it on the Very valid category. these findings contribute to the field of mathematics education by providing a proven, RME-based framework for LKPD design that bridges the gap between abstract multiplication concepts and real-world application, offering a practical alternative to commercial worksheets.

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INTRODUCTION

Mathematics is a field of study that is closely related to everyday life. Therefore, mathematics is taught to students from the elementary level through junior and senior high school, up to

higher education. This reflects the fact that mathematics is an exact science and serves as the foundation of other disciplines, making it inherently interconnected with various fields of knowledge. A well-designed mathematics learning process supports the achievement of effective learning outcomes (Novriani et al., 2021). One aspect of mathematics that is continuously used in daily life is multiplication. Mathematical understanding plays a critical role as a basis for reasoning when solving mathematical problems (Yetti & Afriyani, 2021). According to (Islami et al., 2025), understanding basic mathematical concepts in elementary school is essential, particularly in multiplication and division of whole numbers, so that students can relate fundamental principles to real-life applications. Multiplication skills represent a foundational concept required to master more advanced topics, as subsequent concepts are often linked to multiplication. However, in practice, students' conceptual understanding of multiplication remains relatively low (Shipa Faujiah & Nurafni, 2022). Research conducted by Nurhayati & Langlang Handayani (2020) found that students' difficulties in learning multiplication are partly due to teachers using only multiplication posters as instructional media, indicating the need for innovation in learning materials. Some students who have not yet understood the concept of multiplication still rely heavily on the multiplication posters displayed in the classroom when trying to find the product of a multiplication problem (Handayani et al., 2023). Tradisional rote memorization fails to build number sense which is why an RME (Realistic Mathematics Education) approach is logically necessary.

Student Worksheet (LKPD) serves as teaching materials or tools that help teachers deliver learning content to students. By using LKPD, students become more motivated in learning mathematics, which leads to improved learning outcomes (Marlina & Syamsurizal, 2023). According to (Septian et al., 2019), teachers are generally accustomed to using textbooks provided by the school, even though the materials are often incomplete, and LKPDs are usually obtained by purchasing them from regular book sales representatives. Similarly (Nurhayati et al., 2023) reported that the LKPDs used by students are often difficult to understand, thus requiring additional worksheets that can facilitate students' comprehension of the material, which is expected to enhance their motivation and academic performance. There are three criteria for the quality of LKPD: didactic requirements, construction requirements, and technical requirements (Septian et al., 2019). In the learning process, students tend to be less active due to a lack of understanding of the material, as the LKPDs used do not present contextual problems as an entry point for learning. Therefore, it is necessary to develop teaching materials in the form of LKPD that adopt a learning approach suited to students' characteristics.

Realistic Mathematics Education (RME) is a mathematics learning approach developed to bring mathematics closer to students. Real-life problems are presented as the starting point of mathematics learning. The use of realistic problems aims to indicate that mathematics is closely related to students' daily lives. The application of the RME approach integrated with ethnomathematics has been shown to affect students' mathematical understanding (Rahmayani et al., 2021). (Khatimah & Fatimah, 2023) stated that ethnomathematics-based LKPD using the RME approach can help students become more engaged and independent in learning. According to (Chandra & Hidayati, 2023), the development of RME-based LKPD is intended to create more varied learning experiences that are aligned with the advancement of knowledge and the characteristics of students. In a study conducted by (Fitriyani et al., 2023). The primary objective of this study is to produce valid LKPD based on a realistic mathematics approach for elementary schools.

RME-based LKPD was found to facilitate students' mathematical understanding and demonstrated good quality through validity and practicality testing. The low level of conceptual understanding in multiplication remains a significant issue that needs to be addressed. Therefore, this study focuses on the development of teaching materials in the form of LKPD

using the RME approach on multiplication material for elementary school students, aiming to produce a valid learning resource.

METHOD

This study used a development-type design research approach. Design research consists of three main stages: the preliminary research phase (preparation and design), the prototyping phase (including self-evaluation, expert review, one-to-one, small group, and assessment) (Putrawangsa, 2018). In the preliminary phase, the researcher conducted problem analysis, reviewed relevant literature, and performed the design stage, which involved planning solutions to the identified core problems. The prototyping phase aimed to develop and refine the proposed solution through several activities, including self-evaluation, in which the researcher independently evaluated the initial product resulting in Prototype 1; followed by expert review, one-to-one sessions, and small group trials. This study was limited to the development of Prototype 2, which was obtained through the expert review phase. A descriptive technique was used to analyze the data. The final product of this study was an LKPD on multiplication material using the RME approach for Class 2 elementary school students. The research subjects were second-grade students of SDN Sarimulya in Karawang Regency. The development flow of the LKPD is presented in Figure 1.

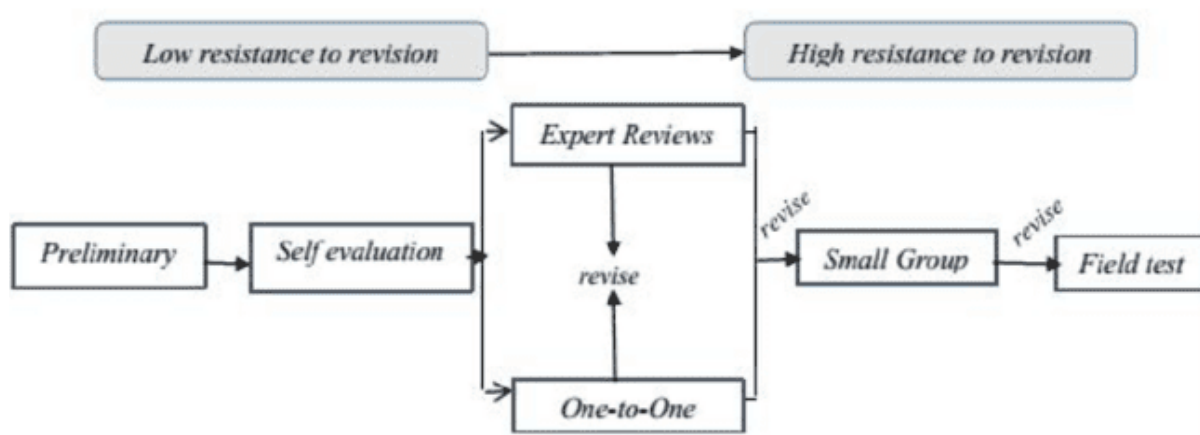


Figure 1. Formative Evaluation Design Flow (Tessmer, 1993)

The data collection technique in this study used qualitative data obtained through interviews and observations. The data analysis technique involved the validation of the LKPD based on the RME approach. The results of the data analysis were used as the basis for improving the developed product. The assessment guidelines are presented in Table 1:

Table 1. Validation Instrument for Data Analysis

Response option	Score
Very Good	5
Good	4
Fair	3
Poor	2
Very Poor	1

The scores given by each expert were analyzed to calculate the average score. The percentage of responses was calculated using the following formula.

$$\text{Percentage} = \frac{\text{total score} - \text{minimum score}}{\text{maximum score} - \text{minimum score}} \times 100\%$$

The validation results were presented in Table 2.

Table 2. Validity Categories

Percentage score (%)	Interpretation
81% - 100%	Very Valid
61% - 80%	Valid
41% - 60%	Fairly Valid
21% - 40%	Less Valid
0% - 20%	Not Valid

The instrument validity category refers to the criteria presented in Table 2. This study was conducted from 19 to 21 May 2025.

RESULTS AND DISCUSSION

Results

Preliminary Evaluation

At this stage, the researcher analyzed the characteristics, content, and curriculum, and identified several findings, including: (1) the Student Worksheets (LKPD) used by students had fulfilled the core competencies and basic competencies along with their achievement indicators, as aligned with the curriculum; (2) the LKPD used did not introduce contextual problems as the starting point for learning; and (3) students required worksheets that could facilitate both students and teachers in a meaningful and enjoyable learning process. The solution to these issues was to design four LKPD sessions on multiplication material using the RME approach, while considering the alignment of indicators, competency achievement, learning objectives, and product quality assessment instruments.

Formative Evaluation

This stage consisted of self-evaluation, expert review, one-to-one, and small group phases. Each phase had its purpose in the validation process of the developed LKPD, resulting in several prototypes before producing a final product to be used in the field test phase. However, in this study, the researcher limited the process to the expert review phase, which resulted in Prototype 2. During the self-evaluation phase, the researcher conducted an independent review and made minor revisions in terms of presentation and organization, which led to the creation of Prototype 1. The expert review phase in this study focused on validation by one lecturer from IKIP Siliwangi and two senior teachers from SDN Sarimulya 3. The validation aspects included the compatibility of the LKPD with the characteristics of the RME approach, content suitability, language appropriateness, and presentation quality. The validation results are presented in the following table:

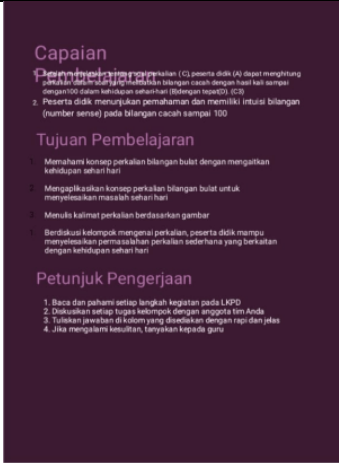
Table 2. Validity Categories

No	Validator Name	Score	Maximum Score	%	Category
1	Dr. Aprilianto, M.Pd.	88	100	88%	Very Valid
2	Erni Resmini S.Pd.	89	100	89%	Very Valid
3	Euis Yatnikasari M.Pd.	93	100	93%	Very Valid
Average				90%	Very Valid and can be used with revisions

Based on the validation results from the three validators, the outcome indicated that the LKPD was very valid, with an average percentage of 90%. Although the LKPD was categorized as

very valid, several suggestions and recommendations were provided by the validators to improve the quality of the developed LKPD. These suggestions aimed to refine and enhance the worksheet:

Table 4. Suggestions for Improvement

Before Revision	After Revision
	
	

In the image in table 4, changes can be seen in the visual aspect and layout of the instructions in the revised version using better color contrast than before, which looks darker and the placement of points is more structured compared to the initial version of the LKPD before the revision. The LKPD can be seen at the following link:

https://docs.google.com/presentation/d/1udp8_6vkXohjNRZH83JhTrHSb9vUwBUX/edit?usp=drive_link&oid=107513743186449424478&rtfpof=true&sd=true

Discussions

Based on the analysis and findings, the LKPD using the RME approach was declared very valid for teaching multiplication material to Class 2 elementary school students. The LKPD was designed to align with the characteristics of the RME approach, which is highly compatible with the cognitive development of Class 2 students who are not yet able to think abstractly. By incorporating real-life stories that reflect situations familiar to students, such as events occurring in the classroom, the LKPD facilitates students' understanding of multiplication concepts.

Setiawan (2019) found that before moving on to abstract mathematics children can do math while playing, so they do not feel intimidated by many numbers. In the study conducted by Septian et al. (2019), it was also found that the use of RME-based LKPD in Class 5 of elementary school had a positive effect on student achievement. Subsequently, in research Umbaryati (2016) the development of LKPD can assist in the learning process and facilitate good interactions between teachers and students, as well as improve activities and learning achievements.

Consistent with research by Chandra & Hidayati (2023) realistic mathematics-based LKPD is practical for use in the teaching and learning process. Mutiarahman et al. (2022) state that using realistic mathematics-based LKPD aims to train and improve students' ability to discuss contextual problems in the real world. Then, Siahaan (2020) notes that the teaching and learning process requires components that can attract student interest—such as learning models and teaching materials—and her research found that developing RME-based LKPD is effective in increasing student interest. Romadhon (2024) states the need to develop ethnomathematics-based LKPD with a realistic mathematics approach to provide new experiences for students, aiming to make the material more meaningful, provide challenges, and foster a love for Indonesian culture. Finally, Nopi (in Ariani et al., 2023) emphasize that problem-based LKPD using a realistic mathematics approach is essential so that students are actively involved in solving existing problem.

CONCLUSION

Based on the validation results from the validator, it can be concluded that in making LKPD, it must be adjusted to the characteristics and needs of students and in accordance with learning objectives. These results indicate that the mathematics worksheet product based on a realistic mathematics approach for 2nd grade elementary school students is very valid with an average of 90% and can be used as teaching materials in the learning process. This shows that the integration of real-world contexts into multiplication material is effective in helping 2nd grade elementary school students. Building a more concrete understanding of the context. This finding has implications for the importance of presenting abstract mathematics material to be more relevant to students' daily experiences. Suggestions for further research are to conduct research up to field trials. Student worksheets based on a realistic mathematics approach to multiplication material are expected to be developed for other materials.

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